

PC PILOT

The Magazine for Flight Simulation in association with www.simflight.com

FLIGHT UNLIMITED III

We take you through the looking glass

FREE with this Issue

TWO PRODUCTS worth over £40!

Plus demos, shareware, the latest patches and Utilities

FLANKER 2.0

More than another shoot-em up?

FIRST LOOK

Airport Inc., RAF 2000,
Pacific Combat Pilot

POLICE CAMERA ACTION

We take to the skies with
coppers in choppers

GETTING STARTED

We tell you all you need to know
to have more fun

REVEALED!

Behind the scenes with B17 II -
just what makes a good sim?

WIN GREAT AVIATION GEAR!

Very special prizes up for grabs

FEEL THE POWER

We test the best sticks for sims

PLUS ALL THESE REVIEWED:

Flight Simulator 2000 • Flight Unlimited III • Flanker II • Precision Pilot •
FS Traffic • Electra! • Fly Lauda • Aircraft Animator • and more inside...

ISSUE 2: UK GBP £4.99 EUROPE/USA £6.99 ROW £8.99



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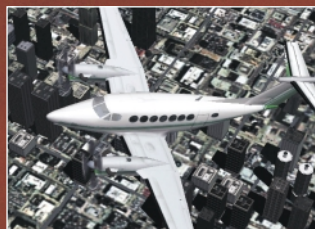
NEW YORK NEW YORK SO GOOD YOU LANDED TWICE

NEW Microsoft® Flight Simulator 2000 Professional Edition now includes the British Airways Concorde as well as 12 cities displayed in intricate 3D detail. So good, you'll want to land again and again... It's as real as it gets!

New for 2000:

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20,000+ airports
12 aircraft
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Boeing 777-300
Raytheon Beech King Air 350
Mooney Bravo
Exclusive Jeppesen NavData Database
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Graphical flight planner
Real-time moving map
New IFR training panels
Downloadable weather updates
Flight dynamics editor
Instrument panel editor
Interactive lessons by Rod Machado
320+ page pilot's handbook
Optimised for Pentium III Processor



New aircraft and new 3D scenery



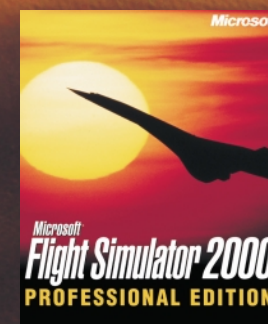
New high resolution, IFR instrument panels



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*Competition ends November 30th 1999. Please check www.microsoft.com/uk/games/ for full terms and conditions.



For more information and the chance to win a trip to New York on British Airways Concorde for the Millennium*, visit www.microsoft.com/uk/games/



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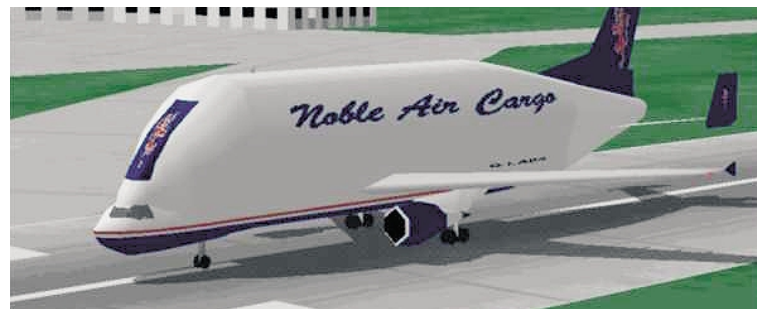
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Flying policeman Tony Madge gives us an insight to life in the West Midlands' skies and his passion for flight sim.



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Kenji Takeda shows you how to get more from flight simulation, meet new people, fly new aircraft and have more fun.



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Editor's Letter

Welcome to the second issue of PC Pilot.

It would appear that the magazine has surprised many in the UK, where until now, there has been no publication dedicated to flight simulation. We have received literally hundreds of e-mails and letters from readers congratulating us on the format and also requesting the very things we already have planned for future issues! You will find many of items included this time around. Thank-you all for your correspondence and please keep it coming in. Be assured that we are acting on your requests.

A small part of our Flight Simulator 2000 preview last month upset a few people. Controversial contributor, Trevor Morson, attacked the inclusion of the Sailplane, unfortunately without giving a reason why. This generated some interesting responses, which you can read in our new 'Comms' section. We like feedback at PC Pilot as it gives everyone an opportunity to voice his or her opinion. Keep it coming!

One of the advantages of being primarily subscription-only is that we can offer much more value to our readers. This issue we have included a free CD-ROM which includes two commercial expansions, courtesy of The Associates.

In this issue we have a superb insight into the workings of the Police Air Support Unit based at Birmingham. To accompany this story, we have an Explorer helicopter for Flight Simulator

98/2000. This can be found on the cover CD together with a host of other great files.

Bill Stack takes the flight envelope up a gear by introducing two detailed flights from London City to Stansted. All the relevant charts are included courtesy of Jeppesen with standard instrument departure and arrival routes. Readers have expressed that they enjoy this feature and would like more charts and information incorporated. We have doubled the amount of charts and will be adding more material in future issues.

Think about coming to visit PC Pilot and its entourage at the National Motorcycle Museum in Birmingham on the 4th December for the Flight Simulation Exhibition. We would love to see you. It is a simmer's paradise, where you can find out all you need to know about your favourite hobby.

Lastly, PC Pilot would like to wish you all a happy Christmas and a great Millennium. May you fly high and have safe landings. See you in 2000!

Mike Clark
Editor
mike@pcpilot.net

COMMS

Where are you Papa Tango?

(Other COMMS Letters continue overleaf)

FROM: Tyler Gladman

"Last month I purchased two Papa Tango products, Fly Lauda and Flight Academy. I found these to be very detailed and enjoyable. The adventures, I felt were particularly interesting and engrossing.

The adventures in Flight Academy are to be completed in sequence, to enable you to be promoted. At the end of each adventure you are given a code to enter before beginning the next. The last provides you with a code for the Papa Tango Premier lounge. The Premier Lounge is meant to be on the Papa Tango web page, where an extra file is available to be downloaded.

However, after completing all 12 adventures successfully and receiving my personal code, I could not find the Premier Lounge, or any mention of it on the web site, but only in the documentation supplied with the software. Also the documentation for Fly Lauda mentions additional files downloadable from Papa Tango's web page. I have e-mailed Papa Tango concerning these files, but have had no reply to date.

If you review these products in the future, could you please investigate the downloadable extras claimed to be available by Papa Tango. After working to complete the adventures, it is disappointing not to find the 'rewards' expected."

EDITOR'S Reply:

You are not the only person to experience problems in obtaining a response from Papa Tango. We have written and not had replies to our own questions. A shame, as poor support ultimately lets down good products. We are already researching a feature on the quality of technical support from a wide variety of simulation companies. The results should prove interesting. If readers have any tales to report (good or bad) then let us know!



The Crew

Chuck Dome

Chuck Dome is a legend. He has been around since the beginning and is known around the world as a leading figure in Flight Simulation. Chuck has created aircraft, scenery, panels and utilities for the flight simulation industry since 1990. He has also had many articles published in "other" flight simulation publications.



Greg Gott

Greg has held a private pilot's license for 11 years and enjoys cruising around the New England countryside in Skyhawks and Archers. Greg is a genius with hardware and knows many different types of system... being one of the first "overclockers". Some of his much-praised articles can be found at www.simflight.com.



Tony Hawes

Now retired from the RAF, for the past seven years Tony has edited ROM, the monthly newsletter of the Guildford PC User Group. Prior to retirement he was training officer in a major (UK) government department with a particular interest in the application of computer graphics to Computer Based Training. An avid flight simulator fan, Tony's first experience of PC flight simulators dates back to 1987 when he first flew the then BAO/Microsoft Flight Simulator. He has regularly upgraded since then and is now enjoying the wonders of FS 2000.



Joe Lavery

Joe has been a flight simulator enthusiast since the BBC Micro days and became interested enough to complete a Private Pilots course in 1996. He began his writing career covering mainly graphics and CAD reviews due to his background in this area but more recently has hosted a flight simulator column covering all aspects of simulated flight.



Alexander Lawrence

Alex is a popular and experienced member of the flight simulation community having worked for some top web sites. Alex combines his time at PC Pilot with that as chief reviewer for www.simflight.com. He is a flight simulation designer and renowned for his freeware panels for Microsoft Flight Simulator.



Trevor Morson

Part owner of a DC-3 (N763A) Ozark Airlines, operated by the Prairie Aviation Museum, Illinois. Author and developer of 'DC-3' - an expansion pack for Microsoft Flight Simulator 98. Trevor hosted a popular flight simulation forum at simflight.com and has written many editorials and reviews for flight sim products and general aviation.



Jean-Luc Neale

Jean-Luc is an experienced journalist and has been around the flight simulation arena for many years. Jean-Luc manages AVSIM Online's European operations gathering the latest news that is relevant to the whole flight simulator hobby.



Bill Stack

Bill Stack has written numerous books and articles about business, management and marketing and has trained thousands of business and government professionals. With his flight simulation books, he applies his training background to help fellow flight simmers reach their greatest potential in flight skills.



Kenji Takeda

Kenji is an experienced computer journalist who has worked for such magazines as PC Gaming World, Computer Life and PC Review and is also a contributor to Gamespot UK. He holds a Master of Engineering degree in Aeronautics and Astronautics, a PhD in Aerodynamics and is a professional member of the American Institute of Aeronautics and Astronautics (www.aiaa.org). When he's not flying for PC Pilot, he is busy performing research in aerodynamics, developing techniques to model aerodynamic noise and finding ways of reducing it to help make our airports quieter in the future.

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In a storm about gliders



Many of you wrote with critical words on Trevor Morson's preview of Flight Simulator 2000 and his dismissal of the glider... this letter sums up the strength of feeling:

FROM: Geoff Graham

"You dismiss the sailplane saying "sorry folks, we could not understand why ... any glider for that matter was included." I have used Flight Simulator for a good few years (starting in DOS) and as a retired meteorologist I have always been very frustrated by my inability to get much out of Flight Simulator as a gliding simulator. After all, you are able to "tweak" temperatures in the upper atmosphere which lead me to expect that this would have an effect on the thermal strength but no! Tweaking atmospheric lapse rates had no effect that I could discern and therefore the sailplane experience has always been a disappointment to me in that simulator. I therefore read your preview of Hangsim with great interest. If I am not putting an optimistic gloss on the Q&A panel, Ilan Papini seems to be saying that he has at last stepped forward to fill this need for dynamic, atmospheric modelling within PC flight simulation. Now, I am no programmer and therefore I do not know what magnitude of demand the inclusion of a dynamic, atmospheric model places upon the resources of a PC. On the other hand, I tend to believe that a simple model could have been included within Flight Simulator without too great a processing penalty.

I would be very interested to read the comments of others on this aspect of PC flight simulators. Your rather narrow view of the need for gliders in mainstream sims sadly reflects a view that I have encountered during 50 years of building and flying model aircraft. For my own part I have always found the challenge of flying radio controlled model sailplanes far, far more testing and therefore rewarding than flying powered models. After all, if the airframe is OK, the engine and controls reliable then the only skills required are those of piloting. Remove the power and immediately one requires a quite different and infinitely more demanding knowledge, intuition and skill level to get the airframe to gain height!

I will be one of the first customers for Hangsim I reckon and I look forward to being able to "dial in" my own thermals. When U.K. topography and scenery becomes available for Hangsim then all the better!

Though this is a slightly critical letter I would not wish to detract from the splendid, all round nature of your new publication, which like dynamic atmospheres for flight sims, is long overdue!"

You love us . . .

FROM: Mario Costa

"I just received my 1st issue of PC PILOT &...LOVE IT! I'm a current subscriber to all the flight sim magazines, but I must say that this one is by far, THE BEST! You took over where all the others left off. Finally, a magazine that isn't 2/3's Combat and 1/3 Civil. The format is outstanding, the quality of the photos is good, the breakdown of subjects is, again good.

My two favourite sections were your news & preview sections. On the other hand, in your reviews section, I especially liked how you rated & compared the product to others. Again, congratulations & please keep up the good work. You've got a long-term subscriber here. I'll be passing the good word to all my fellow simmers."

FROM: Tom Main

"I just wanted to send a quick note and congratulate you on an excellent magazine. The professionalism that is evident from cover to cover was refreshing and most pleasing. The layout/style is more reminiscent of great computer magazines instead of the "basic" feel of the current crop of FS publications. I really felt like I was reading a mainstream publication instead of the usual newsletter feel of the FS magazine."

FROM: Karl Taverner

"I have just received my copy of PC Pilot and I must write to you to congratulate you on a superb magazine"

FROM: Bob Ford

"Congratulations on Issue 1 of PC Pilot - the best flight simulator magazine I have seen. I have been flying since the days of Microsoft Flight Simulator 3 so I should know. In a future issue, how about some more hardware reviews? For example, how Intel and AMD CPUs compare when it comes to flight simming!"

FROM: Romaine Wright (Mrs.)

"I'm very impressed not just with the mag which is excellent, but also with your speedy delivery service. Compared to Computer Pilot, which I'd looked at but decided against, PC Pilot, is way ahead in my opinion. I'm a female flight simmer of one year and although now 40 and disabled, am discovering a whole new way of life. I've also just made contact with a Jersey European Captain who's offering to enable me to visit their main Simulator at some stage, which is a big opportunity for me. I'd certainly appreciate an article on the facilities

CONTRIBUTOR Trevor Morson Replies:

"I believe your point of view is a good one. I dismissed the idea of a glider because of the very things that are lacking in previous versions of Microsoft's Flight Simulator such as atmospheric pressure, varying winds and thermals. Winds generated in this sim are very good when it comes to direction, temperature and speed but when one flies a glider you must also take into account thermals and varying wind direction around mountains or clouds. This simulator, like most, lacks these features. Therefore, there tends to be less of an interest in the glider in favour of other aircraft in the fleet. One can only hope, as you suggested, that simulators will implement winds and thermals to such realism and that the glider will be finally appreciated for what it is."

DEVELOPER Ilan Papini Replies:

We also asked Ilan Papini, developer of Hangsim, for his view on this same issue: "Hangsim was created because of my frustration with existing flight simulators. Being a pilot and an aeronautical engineer I was disappointed time after time to see that the current simulators totally neglect micrometeorology and its effects on light aircraft. In Hangsim you will see and hear what is really like to be sitting in a light glider and, through many small but important details, you will get the true sensation of free flight."

COMMS

Let it not be said that we do not listen to our readers. Many of you wrote to say you wanted to see a letters section in the magazine. We've tried to cram in as many as we can, so apologies if you did not get included. Please keep writing. A mystery prize for the best letter printed in the next issue!

available to the public on application to the right people – e.g. Full size simulators, Jump seat flights etc. Many thanks again for an excellent work."

. . . You love us not!

FROM: Kai Lehtonen

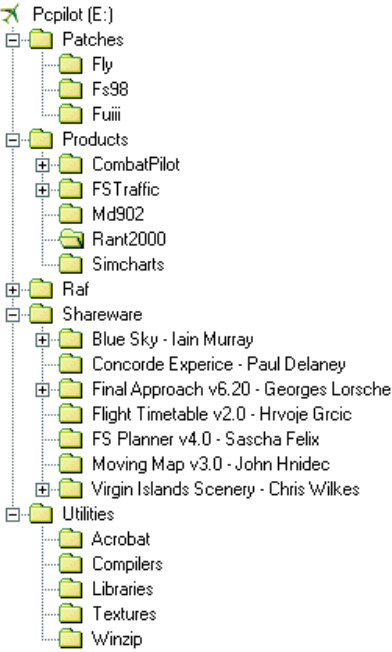
"As feedback I would like to say that the contents were mostly OK but the layout and the use of colours is terrible. How do you expect the reader to be able to see the white text against yellow background? And the Electra story is so restless to look at that I just jumped over it.

The sub-headlines are set with such a small space that the letters melt together making it again difficult to read. Teething troubles, perhaps, but it makes one wonder whether your layout department has gone crazy. On the Fly! review I think it sounds more like a commercial. I have for instance seen scenery layers glide back and forth under the runway when on finals to Meigs and also in New York. The overall colours of the scenery are dull and the sceneries very poor compared to all even Flight Simulator 98 has to offer.

Please tone down the layout and make it easier to read instead of playing with all those too bright coloured pasteboards!"

EDITOR'S Reply:

We have received a number of letters concerning the layout – both favourable and as above, less favourable. We have toned down the look a little which we hope you will like. Our review of Fly! gave 3/5 and did raise concerns on the overall quality of the program, highlighting the need for a patch. There have been plenty of suggestions received and be assured that have taken note of them all and will cover requests where able in future issues.



IMPORTANT - TECHNICAL SUPPORT

We have done our best to ensure that the software on the special CD-ROM installs and runs without problems. However, with the final version of Flight Simulator 2000 shipping as we went to replication it has not been possible to fully test any of the add-on software with Flight Simulator's latest incarnation.

The CD and the software on it (with the exception of shareware files) is free and as such PC Pilot, The Associates nor any of the publishers or developers of the software supplied on the CD can provide technical support. The software is supplied very much 'as is' and without support. Enjoy the CD and the software on it!

The Free CD-ROM

With this month's issue of PC Pilot we thought we we'd surprise you with an extra-special free CD-ROM! We've even managed to coerce the mighty Associates into giving away two hot titles for nothing – exclusively for PC Pilot readers. These products are currently on sale and combined worth a staggering £44.98!

What's more, on the attached cover disc you will find a selection of free software, some of the biggest shareware currently available, utilities to update your flight simulation installation and various essential files needed to use other third party add-ons.

The CD-ROM is supplied with an installation routine that will automatically start when you insert the CD-ROM into your drive. A menu will appear allowing you to navigate your way through to the software to install on your system. Just click on the 4 different icons in the menu window to navigate between the different sections and then click on the name of the program you want to install.

If you do not have 'Auto Start' activated then simply click on the 'Start' button, then 'Run...' and type in 'E:/start.exe' (Where "E" is the drive letter of your CD-ROM drive)

RAF Collection

This expansion for Microsoft Flight Simulator 98 proved one of the most popular products of the past year, raising thousands of pounds for the RAF Benevolent Fund charity. With the sequel due to for release in January (see the RAF 2000 preview later in this issue), we think this is a timely inclusion.

The product provides over 30 aircraft, a wide variety of panels and scenery of some 200 airports in England and Wales. We've included an installer for Flight Simulator 2000 in the set-up process. Please note that the scenery will not work and a few minor problems may be experienced with some aircraft in Flight Simulator 2000.

Manuals are supplied for the product in Adobe PDF format in the RAF folder on the CD. These can be read on screen or printed out (see the Acrobat utility detailed below).

Combat Pilot

This was the first dedicated expansion released for Combat Flight Simulator and has proved one of the most popular. Combat Pilot Number 1 (Attack) Squadron provides some of the best looking aircraft for the Microsoft original outside of Redmond.

Manuals are supplied for the product in Adobe PDF format in the Combat Pilot folder on the CD.

Product Demos

Also included are some fantastic demos of product currently available on the market. These are limited software titles that allow you to experience the product before purchasing them. Please read the various Help files that come with the programs to find out more about using them.

Included are:

RANT 2000 – this is the professional big brother to Precision Pilot as reviewed in this issue on page 42.

SimCharts – this provides a number of Jeppesen charts for you to view on screen. See our review of SimCharts on page 43 to get our view on the full version.

FS Traffic - a time-limited version of this great utility that adds dynamic aircraft to any airport in Flight Simulator 98 or 2000.

MD902 Helicopter - this is the Explorer helicopter, created by Tony Madge and as featured in our Police Air Support Unit feature on pages 52-56. Simply extract the files to your Flight Simulator 98 or 2000 /Aircraft folder.

Shareware

Shareware is a great way of trying software before buying. We have a wide selection of titles, provided from the www.simflight.com Share Centre:

- Blue Sky** by Iain Murray – Change FS98's default sky to a more realistic blue colour.
- Concorde Experience** by Paul Delaney – Fly the fast one. The Concorde SST.
- Final Approach v 6.20** by Georges Lorsche – A superb utility providing thousands of airport approaches and maps.
- Flight Timetable** by Hrvoje Grcic – Assists you when planning flights, down to the last detail.
- FS Planner v4.0** by Sascha Felix – One of the most popular flight planners out there.
- Moving Map v 3.0** by Hohn Hnidec – A simplified GPS. Great for blind navigation.
- Virgin Islands Scenery** by Chris Wilkes – Provides a beautiful rendition of the Virgin Islands.

To install the shareware, access the CD using 'Windows Explorer'. Select the folder of the program you wish to install. Read the 'Readme' file that comes with each product FIRST and then either;

Double click on the 'XXX.exe' file to install the program on your system or navigate your way there by clicking on 'Start' button, then 'Run...' and type in 'E:/start.exe' (Where 'E' is the drive letter of your CDROM drive). Note: Virgin Islands Scenery does not have an installation routine. Please read the text file called 'StCroix.txt' for setup instructions.

Shareware is made possible by the honesty of people. Please be sure to read carefully any licensing agreements that come with each shareware product and if you use the product to pay the registration fee, which usually affords you new updates and technical support.

Patches

These are the very latest updates and patches for various flight simulators. A simple installation routine will update your system.

- Flight Unlimited III Patch** – Fixes known issue and bugs in Flight Unlimited III.
- Fly! Patch** – Fixes known issue and bugs in Fly!
- FS98 Converter** – Converts aircraft and adventures created with BAO flight shop to work with Flight Simulator 98.
- FS98 Patch** - Fixes known issue and bugs in Flight Simulator 98.

Utilities



Adobe Acrobat Reader - A software utility that lets you view and print Portable Document Format (PDF) files. Acrobat Reader also lets you fill in and submit PDF forms online. Lots of software developers now use PDF files for their Help sections in software. You will also need this software installed to view and print the manuals for the free products on the CD-ROM.

Compilers - Many ATC programs such as Proflight 98 and WinPlanner Plus require an extra utility called an 'APLC Compiler' to help generate adventures you have made. This particular APLC compiler allows larger files to be generated. Simply follow the instructions included in the Zip file. Also included in this folder is a file called 'FS6iPC61.zip' This module is often required by applications that need to access data from Flight Simulator 98. Simply extract the DLL into your Flight Simulator /Modules directory.

Libraries - These runtime libraries are often needed for flight sim add-ons programmed in Visual Basic, a

programming language different to Flight Simulator 98. These are two different types of runtime files, version 4 and 5. They must be installed as two separate items. They are not the same. Only install these files if the software you intend to use states that it needs them.

Textures - Some freeware scenery files downloaded from the Internet require extra textures for you to take full advantage of them. This is because the maker has designed the scenery with a particular utility. The textures we have included are 'Airport 2.02, Visual Object Designer' and 'Airport and Scenery Designer'. Unzip into your /Flight Simulator /Textures directory or the independent texture directory of the scenery you want to use.

WinZip - This is a shareware product that unzips files from compressed format. Most items downloaded from the web will be in this compressed format, as are some of the items on this CD-ROM. Simply double click on the file in the folder from a temporary directory and the installation will do the rest for you.

Coming next issue...

The first millennium issue of PC Pilot is going to be an exciting one. We have the best reviews including Tuskagee Fighters and Wings over China from Abacus plus F/A-18E Super Hornet from Titus software. Plus RAF2000, Austria and loads more to get your teeth into.

We delve into the work of Dr Kenji Takeda at Southampton University and learn some tricks of the serious simmer and the hardware they use in everyday PCs.

Hardware Eagle, Greg Gott, pulls yokes and pedals apart to tell you what's best.



We will be providing two of Jeppessen's excellent printed SimCharts FREE. These en-route charts cover the entire UK and parts of Europe. An essential addition for all flight simmers.

See you next issue with this and more!!!

PROPILOT 2000 CANCELLED

Just as we went to print on the last issue, Sierra On-line had the gall to lay off the entire staff at Dynamix, the developers of Desert Fighter and ProPilot 2000. The shock move is due to rising costs of game production and Sierra are thought to have kept popular titles like the Tribes role playing games on in their core games unit. However, Sierra president Dave Grenewetzki said that flight simulation titles are "good solid products but they are not making enough money to justify them".

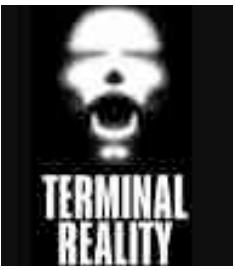


The more cynical of us at PC Pilot think that they perhaps found the competition from Microsoft, Looking Glass and Terminal Reality just a little bit too hot.

We are all sad to see the end of the line for the ProPilot series.

Publisher: Sierra/Dynamix
Web: www.sierra.com/dynamix/pilot

TERMINAL REALITY FLY! AGAIN



Just months after the somewhat damp release of the original, Terminal Reality has outlined what can be expected in the next version of Fly! The imaginatively titled Fly II will expand on the aircraft and scenery that proved popular in the first version. Higher resolution images and new elevation scenes are also promised. When Terminal Reality was working on the first version they consulted aircraft manufacturers to ensure accurate flight models. AJ Fuller, producer of Fly, said: "For Fly II, we are turning to the flight sim community, listening to what the players are requesting and gathering information. As we move ahead, we consider the flight sim community to be our co-

developers". Fly! has followed an open architecture model, just like the Microsoft's series, though failed to make much of a dent in its rival's market. Add-on sceneries and aircraft can be found and downloaded from popular web sites. See later this issue for a Preview of Precision Manuals' great looking 757 expansion for Fly!

Developer: Terminal Reality
Price: TBA
Web: www.iflytri.com

ATC GOES LIVE IN FLIGHT SIMULATOR 2000



Radar Contact 99, a very popular adventure creation program for Flight Simulator 98 is reported as now working in Flight Simulator 2000. Radar Contact is a fantastic program that will assign headings, altitudes, speeds and vectoring information for flying those adventures you really would love to fly. The program includes over 1000 audio files, which help achieve the tower and navigation realism of a real flight. To actually use Radar Contact 99 you will also need one of four navigational programs to help with the planning stages of adventure making. All of these can be downloaded from Radar Contact's web page below.

Developer: Doug Thompson and John Dekker
Web: www.flightsimmers.net/radar/contact/

NEWS

For daily news updates log onto www.simflight.com

JUMBO COCKPITS



Sky Design has announced their latest development plans. After the popular 747 Flight Simulator 98 expansion, published by Data Becker, they are now concentrating on creating 'professional' 747 panels for the Microsoft sim. The cockpits are designed to make the flight simulator 747 add-on aircraft even more realistic. A new autopilot system and Engine Indicating and Crew Alerting System (EICAS) and full Flight Management Systems (FMS) will be included. Andreas Herbst the main designer and owner of Sky Design is actually a 737 captain for Lufthansa so you can expect his products to be good.

Developer: Sky Design
Web www.SkyDesign.de

CRIMSON SKIES OVER MICROSOFT

Microsoft has announced the development of their newest titles for next year. Among these, a new combat simulation was unveiled. Crimson Skies is an aerial adventure simulation set in the 1930s, where an alternative history means that the United States has become a fractured continent of Nation States. The skies have become the roadways of the Americas and huge Zeppelins are the main form of transport for cargo and passengers. More game than simulation, Crimson Skies

allows you to fight pirates and other daredevils in five adventure sequences. First glimpses of Crimson Skies look very promising, with great terrain textures and fun aircraft. Crimson Skies is due for release in the summer of 2000. Perhaps better for a bit of fun on a rainy afternoon than a replacement for Flight Simulator 2000, though.

Publisher: Microsoft
Price: TBA
Web: www.microsoft.com/games



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The Producers Limited,
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F/A-18E LOOKING SUPER HORNEY!

Titus software released another attack simulation this month with their eagerly awaited F/A-18E Super Hornet. It is claimed that this simulation is so realistic that the US Navy is currently using it as part of a nation-wide recruitment campaign. Certainly other press reports, based on un-finished versions have been favourable. We will see if our PC Pilots find it so attractive when we give it the full review treatment next month.

Publisher: Titus Software
Web: www.superhornet.com
Price: £34.99



Saturday, 4th December is the day when flight simulation enthusiasts from around the UK converge on Birmingham for RC Simulation's yearly Flight Simulator Show. A variety of developers and publishers will be attending again

MEET THE PC PILOT TEAM

this year. Microsoft will be showing off Flight Simulator 2000 with a multiple system set-up that you will be able to fly. Not only will you be see all the exciting new products that are available or about to become available but a selection of staff from PC Pilot magazine will be there. If you really want to come and meet some of us ugly people, then pop along to the National

Motorcycle Museum in Birmingham, the doors open at 10 am and the show closes at 5pm. See you there!

Contact: RC Simulations: The Hangars,
Bristol Airport, Lulsgate, Bristol, BS48
3EP, UK
Tel: 01275 474550
Ticket Prices: £6.00 (Adults) , £5.00
(under 16's), Children (under 5) Free.

FLIGHT SIMULATOR 2000: THIRD-PARTY UPDATE ANNOUNCEMENTS

ABACUS

Abacus Publishing have set up a web page to inform owners of their products about current compatibility with Flight

Simulator 2000. Once product updates are finished the patch files will be uploaded to Abacus' website for download to users. Products already converted for use in Flight Simulator 2000 include Aircraft Animator, Aircraft Factory 99, Airport and Scenery Designer, FS Flight Bag and FS Flight Deck.

If you need to check your software compatibility or need to patch Abacus products go to their web page detailed below. Hats off to Abacus for their swift action – though we have yet to test their claims on compatibility.

Publisher: Abacus
Web: www.abacuspub.com/fs2000.htm

EFIS 98 FLY THE BIG ONE IN 2000

Chris Brett author of the rather good EFIS 98, a popular navigational add-on, has released a second service pack that enables people with Microsoft's Flight Simulator 2000 to use EFIS 98. Chris also tells us that the EFIS Planner has been altered to make planning a route much easier using the extensive database of airways.

Developer: Chris Brett
Web: www.flight-nav.com

Our advice before purchasing any new add-ons for Flight Simulator 98 or 2000 is to check compatibility. Many claims are being made from all sides, so if in doubt ring up the publisher and ask them those questions you have! At the end of the day if the publisher can't or is unwilling to answer your questions on a product then you'd be advised to avoid – they'll be unlikely to give you the support you need.



NEW USB PEDALS

CH Products have released matching pedals to their USB yoke. CH has for many years now produced one of the best sets of pedals available for flight simulation enthusiasts and the latest release should live up to their reputation. The main features of the new pedals are sliding motion rudder input, heel-toe motion for differential braking and a seven-foot USB cable. Unfortunately the differential braking that can be utilised with



this product can at the moment only be used in Fly!

Manufacturer: CH Products
Price: TBA
Web: www.chproducts.com

FEEL THE GEFORCE!

Creative Labs have started shipping the next generation of graphics cards. Created by Nvidia, the company who brought us TNT and TNT2 technologies, this is the first graphics card with its own processor unit onboard. Launched in November, the GeForce Annihilator card has 32Mb of memory plus a graphics-processing unit (GPU) allowing 32Mb buffering and

high triangle rates. The idea is that the GPU will take the entire graphics load away from the main PC processor (CPU) allowing simulations to run faster and allowing larger memory to be designated to areas like artificial intelligence and other processor-hungry tasks.

Manufacturer: Creative Labs
Price: £199
Web: www.creative.com



HARDWARE NEWS

NEW MAGIC FROM 3DFX

3Dfx have announced yet more new products. Not only are those who are lucky enough to have AGP configured motherboards now able to benefit from 3Dfx's magic touch. Last month 3Dfx launched the newest and fastest PCI graphics board available. The Voodoo3 3000 PCI, like it's AGP cousin runs high performance quality graphics with 16 Mb of memory and a whopping 166Mhz chipset that is able to generate seven million triangle and 333 Megatexels a second (i.e. It's fast!). At just £129.99 this board looks an attractive proposition for those with PCI slots in their PC.



3Dfx have also launched another new graphics card. The Voodoo3 3500TV board is the fastest running Voodoo3 card around. The 3500 might be the last update for the Voodoo3. It comes with a spreader unit that also allows TV in and out through the computer together with audio. This is very useful if you are thinking of videoing your flights onto VHS, so your family and friends can watch just how good you are at flying. Word around the Internet though is that 3Dfx are also working on the next generation of card. Although at the time of press not much is known, we do know that the new card is codenamed Napalm and that naturally it will be an extremely fast graphics-crunching unit. Rumours are that this new graphics board will be able to process one billion pixels a second. Pretty good.

Manufacturer: 3Dfx
Web: www.3dfx.com

COCKPIT DEVELOPER SEEKING HELP

Runway, a new company based in the UK are creating the first virtual cockpit series for flight simulation called Cockpit2000.



Built by a highly professional modelling and special effects company, the Cockpit2000 series will be designed to sit neatly on the average desktop and enclose your flight controls in your own flight simulation world. Modelled lightly on the Boeing 7x7 series cockpits, these add-ons will give the ultimate experience in home flight simulation today and will come in both standard and 'professional' versions.

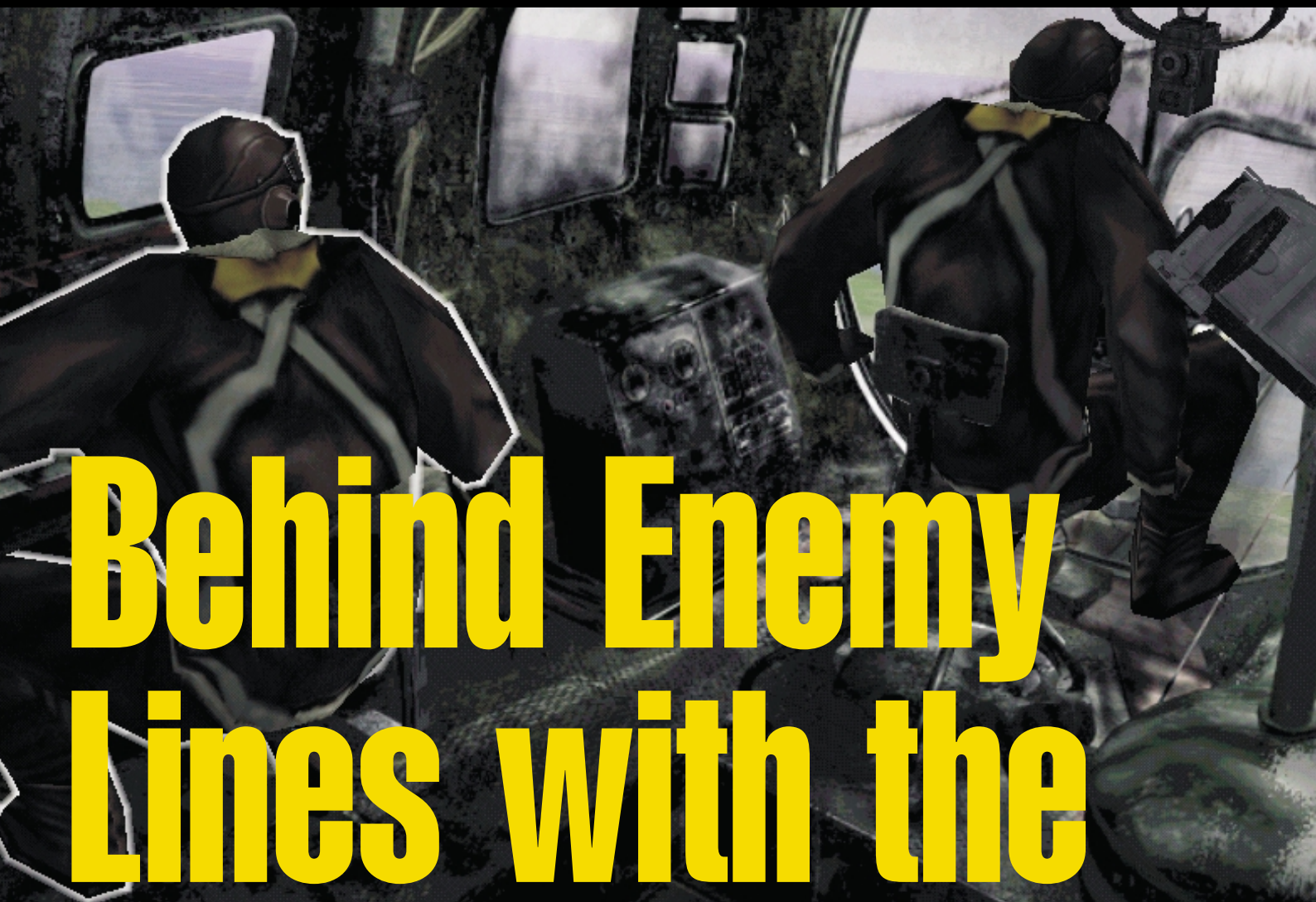
Send them e-mail at info@runway.org.uk with your suggestions and let them know what you would like to see incorporated!

All replies will be entered into a draw in the New Year. The most innovative idea could win you £100-worth of hardware for your cockpit and it may even be included in the Cockpit2000 Pro design!

Developer: Runway
Web: www.runway.org.uk

CORRECTION

In the last issue of PC Pilot we featured news about 'Austria Professional', a product published and distributed in the UK by Papa Tango. We stated the 'Developer' to be Papa Tango. Following a communication from the developers we would like to state that this product is actually developed by 'Flight-Professionals' based in Vienna, Austria. Unfortunately Papa Tango's public marketing materials state something else which does make the issue somewhat unclear. Our apologies to Flight Professionals for the confusion! We will be reviewing Austria Professional in the next issue.



Behind Enemy Lines with the B17 II Team

Wayward Design show how it's done

Over eight years ago, a product called B17 (and based on the mighty bomber of the same name) was released. Part strategy game and part simulation it was a fantastic and complex program, way ahead of its time. Computers were in the early stages of development, 3D graphics cards were only used in the film industry and even Pentium processors were a pipe dream. However, the programmers made it work. It was the most absorbing and dynamic flight simulator of its day.

Almost a decade on, two of the original programmers are working on a sequel. We think it will blow away the competition. We previewed B17 Flying Fortress II in the last issue, but intrigued by the most promising screen shots we had ever seen (and rumoured budget in excess of £1 million), we wanted to know more. PC

Pilot visited Wayward Design, the developers of B17 II, to find out how a project like this is developed and if it would match our initial expectations.

The company is based in the sort of Bristol Georgian town house more commonly used by law firms or doctor's practices. Instead of doctors (or pretty nurses) we found a team of computer programmers obsessed with the accuracies of World War II machine guns. Graham Davis, the studio manager, and producer Iain Howe, gave us a behind the scenes tour of this mammoth project.

From the basic premise of the original B17, Wayward wanted to create a new version, totally updated and improved. In case you missed the details in the last issue of PC Pilot, B17 II provides a total simulation. Whilst it's based on a B17G bomber, the

simulation includes additional aircraft such as the P51, P38, P47, Fw190, Bf109 and others. What makes this project unique is need for the player's strategic and man management skills. As they explain, "...we wanted to improve the artificial intelligence, so the enemy reacts and fights more realistically. And then you have the crew, they were good before but improvements could have been made. We now have the crew able to build up their skill levels realistically. If one is shot, you will have to administer first aid. If you don't keep the injured parties alive, their skills die with them and you have to fly your next mission with a rookie."

Graham took us to see Iain Thody, the concept artist for B17 II, who was surrounded by B17 artwork. There were artistic impressions of the aircraft flying through flak and designs of characters. Each area of the game was laid out and lovingly drawn, like a storyboard for a film.

A major task is the design of the actual aircraft - created using sophisticated CAD (computer-aided design) software. Wayward found old aircraft in excellent condition and took thousands of pictures. As they explain, "...not only did we take photos of the all aircraft we saw, we also had reference books to work with. Many

of these books were out of print and had to be hunted down for this project. We even have a book with all the dials and gauges from old German aircraft from which we gained valuable information".

...rumoured budget in excess of £1 million!

From this material designer, Ken Hall, could start to work on building the aircraft on the computer. The team's aim was to strive for realism. When they worked on the B17 aircraft itself they made a full-size mock up of the cabin, to gauge the exact area. They concentrated on the smallest details: the whole landing gear is accurately reproduced even down to the suspension moving in conjunction with the ground. Nuts and bolts that keep the aircraft together have all been hand placed on the aircraft in their exact position.

Angus Fieldhouse, the computer animator, took the data from the CAD models and added animation effects to the crew, turning simple pictures turn into



The B17 Team



Dominic, co-owner and original programmer



Andrew, co-owner and original programmer



Graham, the studio manager



Ken at his desk where he designs the American aircraft



The Guys. Well are you sure the crew move like that?



Iain Thody, concept artist. So what's the new project on the wall then?



Claire, another artist busy at her desk

characters who move about, fire their cannons and all the other things they might do onboard the B17. Hundreds of animation effects are involved.

Another artist, Claire Cooper, puts all the aircraft interiors together, adding the touches of realism required. She not only makes the panels, but also draws and paints the mission and command rooms in the strategy menus. Claire brings the computer screen to life to put you right in the action.

...looks as if it will blow away the competition

Once all the art, animation and scenery have been completed, it's transferred to Andrew Walrond and Dominic Robinson, the key programmers who also happen to be the company's owners. The maths and formulae are both highly complex and exclusive to this project, which made them pretty secretive. Which was just as well, if they'd tried explaining how they made everything work we'd be lost in minutes. Thanks to their team skills we have smooth textures and sceneries,



which allow higher resolution mapping than ever before.

Wayward gave us a sneak preview of the pre-alpha software just days before it went for evaluation by Microprose. The aircraft are extremely complex and just looking at them from the outside you can almost smell the kerosene burning. We were surprised at the complexity. Everything is in its place but without being sterile, the

cockpits have dents and scratches in the glare screen. Such touches that make you sink into the simulation. Flying is great. There are many views around the plane such as the belly and tail gunner's positions. This is a real benefit when trying to gauge how to fight off the enemy.

The scenery, even at this early stage is superb. Trees and houses are realistic and road details are not repetitive. Unlike any

other simulator, Wayward have created an all-new concept, with scenery that is rendered as a set of individual objects in real time. This means as you dive towards the ground the trees, houses and hedgerows actually get clearer and more visible, rather than disappearing in a pixellated mess – as so often happens with 'photorealistic' scenery in other programs.

Wayward found old aircraft in excellent condition and took thousands of pictures

What strikes you after a day at an operation such as Wayward is the sheer effort, time and money that goes into creating a good flight simulator. While combat simulations invariably end up being marketed as mere games, it is clear that Wayward are achieving something far greater. Of course much more than pretty graphics are needed to create a winning simulation. Wayward have the right stuff and hopefully won't disappoint. ■

Jean-Luc Neale

FALCONS BEWARE

There's a NEW bird of prey on your tail

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FLYING LEGENDS™

Airport Inc.

You can fly, but can you run an airport?



Nowadays, a flight from London to Paris involves more than just sitting in a metal tube at 30,000 feet for 55 minutes. The hapless traveller often spends two hours before and after a flight wandering through huge expanses of concrete and glass. Life ebbs away as you try to check in luggage, find a bargain in the duty-included shops and patiently wait in the gate lounge as the cleaners rearrange the dirt in an aircraft you hope to board half an hour after scheduled departure. Yes, you're at the airport!

The popular BBC fly-on-the-wall programme Airport has shown that there is a lot of interest in the inner workings of a modern air terminal. Krisalis, working alongside publishers Take 2, have gone a stage further and are developing a PC simulation called Airport Inc. Similar in style to titles such as Sim City and Theme Hospital, you are given a sum of money to use in creating an airport with the best possible facilities. The ultimate objective is a profitable and expanding operation that will bring in business from the

airlines and also good vibes from their passengers – the same ones who have to endure slow check-in procedures, late aircraft due to bad weather and all the other joys of modern air travel!

Airport Inc. provides more than just a few management screens for shifting money from one area to another. Krisalis have used high-resolution real-time 3D objects to make it graphically more interesting than other simulations. As well as this very welcome feature, multiple camera views of the locations around the airport can also be set up.

In order to develop from a small local airport to an international hub, 75 possible locations will be available, as well as 1,200 worldwide destinations and 200 airlines to interact with. You will have control of all aspects of airport life, such

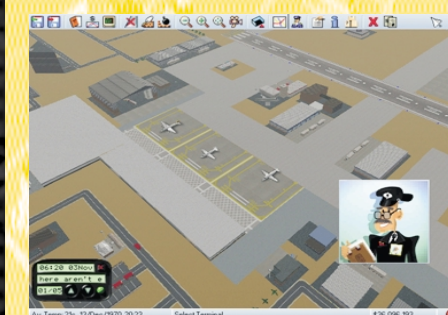
as baggage handling, runway maintenance, air traffic control, shops, restaurants and even environmental issues. These will all combine to varying degrees and affect the smooth running of your airport. The simulation will include a walk-around mode, giving the player a first person perspective on the shop floor inside the airport. Using this feature, you will be able to walk around freely in real time and see the passengers passing through the terminals. Meanwhile, the staff will bring you reports and give advice, greatly enhancing the enjoyment of this title.

Airport Inc. is only in beta at the moment, but should be available sometime in the first few months of next year.

Jean-Luc Neale



SOME EARLY SCREENSHOTS OF AIRPORT INC.



Nice terminal sir, now... about those taxes you owe!



My first customer



What's wrong with this picture? No queues!



Sorry folks, your plane has been delayed by bad weather



There go another bunch of happy punters

PREVIEW

Publisher: Take 2 Interactive
Website: www.take2games.com
Developers: Krisalis

Price: TBA
Expected Release Date: Early 2000

Last year, to coincide with the eightieth Anniversary of the founding of the Royal Air Force, The Associates published the RAF Collection. It contained a selection of aircraft that have served with the RAF over the years. Ranging from a pre-war Handley Page Heyford bomber to the current Tornado Mk.3, this proved to be one of the most popular expansions for Microsoft Flight Simulator. Sales of the RAF Collection have also had the added benefit of raising thousands of pounds for the RAF Benevolent Fund.

Following on from this success and to celebrate the millennium, The



This Lysander is typical of the quality we can expect to see when RAF 2000 is complete.



Royal Air Force 2000

Flight simulation helps our heroes again!

Associates are developing Royal Air Force 2000, a new collection of 20 classic RAF aircraft. Once again, the RAF Benevolent Fund are giving it their exclusive endorsement and a contribution will be made for every copy sold. The Associates have also obtained the rights to use the official Royal International Air Tattoo artwork as part of the striking package design.

The aircraft included are the Avro Shackleton, Avro Tutor, BAe Hawk, BAe Lightning, BAe Nimrod, Boeing Chinook, Bristol Beaufighter, DH Mosquito, Tiger Moth, Gloster Javelin, Handley Page Halifax, Hawker Fury, Hawker Hart, Hawker Hunter, Hawker Typhoon, Jet Provost, Spitfire, Vickers VC10, Wellington and a Westland Lysander.

All these aircraft will have instrument panels and sounds specific to type. Most of them will include moving control surfaces, animated landing gear, opening bomb doors, transparent windows and prop arcs. Some aircraft have specific livery, like the Hunter T7 and Hawk T1A in the colours of Number 4 FTS (Flying Training School). Every aircraft

has been enhanced and tested with Microsoft Flight Simulator 98, 2000 and optimised for Microsoft Combat Flight Simulator.

A welcome inclusion to the collection is the Avro Shackleton, known occasionally by their crews as "20,000 loose rivets flying in close formation" or "the contra-rotating Nissen hut". This successful aircraft, with an obvious predecessor in the Lancaster, entered RAF service in 1951 and was not retired until 1991, despite being described as obsolete by officials in the early Sixties.

The Westland Lysander is another interesting addition. The "Lizzie" distinguished itself early in WWII with many daring Army Co-operation sorties as well as the now famous secret missions to fly agents in and out of German-occupied Europe. Slow speed, plus a short take off and landing capability, made it well suited to covert operations in unprepared fields.

We look forward to reviewing this product in the near future.

Tony Hawes



The Hunter panel looks simply amazing, with beautiful details and atmosphere.

PREVIEW

Publisher:	The Associates	Price:	£24.99
Website:	www.flightsim.co.uk	Release Date:	
Developers:	Blue Arrow		January 2000

Banzai!

Pacific Combat Pilot

PREVIEW

Publisher:	The Associates	Price:	£24.99
Website:	www.flightsim.co.uk	Expected Release Date:	
Developers:	Blue Arrow		December 1999

Over the past year we've seen a number of add-ons for the excellent Microsoft Combat Flight Simulator. The most notable of these was Combat Pilot from The Associates (available for free on the CD-ROM with this issue!), which introduced a wide range of different aircraft for us to fly. We now learn that The Associates are about to release a similar item, this time covering the Pacific area of operations and the war with Japan. It is appropriately titled Pacific Combat Pilot.



A Hellcat makes a carrier approach with arrestor hook lowered



The Mosquito is more agile than it looks



Cockpit graphics are of the highest quality

The expansion was still to be finished when we saw it, but nonetheless managed to impress us with spectacular photo-realistic scenery of the northwest Pacific. There are dozens of beautiful atolls with waves breaking over white sandy beaches, bordered with palm trees that from cruising altitude look very authentic. This effect is emphasised by the addition of some new scenery objects designed specifically for Pacific Combat Pilot, including both Japanese and American aircraft carriers. The scenery area is vast, covering the islands of Guam, Saipan, Tinian, Rota and the northern Marianas.

You can fly 27 new aircraft, all typical of those that fought in the bloody battles of the Pacific arena during the Second World War. There are many old favourites, including the beautiful de Havilland Mosquito and the North American P-51 Mustang, but also some unusual Japanese aircraft with difficult names. Try getting your tongue around the Kawanishi N1K2 Shidenkai, or the Kyushu J7W1 Shinden. However, the Mitsubishi A6M2 Zero Fighter and the Nakajima B5N2 'Kate' are marginally easier to pronounce and recognise!

A complaint heard after the launch of the first Combat Pilot add-on was that a lack of new missions made it seem something



Some of the stunning scenery on offer



You can get too close to the action



The aircraft are rendered with superb detail



The infamous Zero dives into an attack

of a cosmetic enhancement. However, The Associates obviously listened to their customers, because this latest offering includes 20 new missions arranged in 2 separate campaigns. Japanese or Allied sorties can be flown, all based on actual events. Among these is the famous pre-emptive and controversial attack on Pearl Harbour in 1941 that brought the United States into the war.

This is shaping up to be an impressive expansion that rekindles the excitement we felt when Combat Flight Simulator was first launched a year ago. It adds a new dimension to what is undeniably the best WWII combat simulator yet produced. ■

Joe Lavery

Fly! goes further with the 757...

Since our news piece in the last issue, Precision Manuals has been hard at work developing the 'Series 757'. As the project rapidly nears completion, we have dug out the latest details on this impressive looking addition to Fly!

Precision Manuals are better known for their excellent virtual aircraft manuals for heavy jets such as the Boeing 7x7. They have now brought in additional development expertise and turned their attention to enhancing Terminal Reality's simulation.

Robert Randazzo, CEO of Precision Manuals, claims that their 757 will "offer the most realistic simulated flight experience of a heavy commercial aircraft yet. We are using the actual airfoil design data for the flight model. On the first version the flight model flew within 5% of specified performance of the real airplane. From pre-flight planning to shutdown, you'll be doing the same thing the real pilots do. Every switch, knob and lever is represented, and must be properly used to safely operate this aircraft. Of course, for those who wish to simply 'take off', automatic engine/system start-up and simplified avionics modes will be available".

For their money Fly! aficionados can expect a highly detailed model of the 757-

200ER, in six different airline liveries with full moving parts and accurate to within 1 inch of actual aircraft dimensions. Looking at some of the early screen shots here you can see that the exterior and interior views are outstanding.

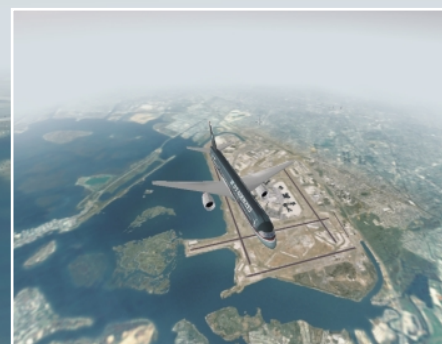
As you'd expect, the developers are providing a chunky 757 Aircraft Operating Manual, containing the detailed technical information you need to plan your flights and operate your aircraft 'by the book': performance figures, charts, graphs, checklists and more should be included. There will also be a 757 Flight Training Guide. This guide will explain every aspect of the 757 in a very simple manner, enabling beginners and experts alike to learn the required systems and procedures to safely operate it.

To round things off, 10 new 'Fly Now' scenarios to use for flight training or as challenging adventures in Fly! will be provided.

Precision Manuals have set themselves an ambitious task for a relatively small potential return, as Fly! has not fared well in sales terms (though this add-on will also be Mac compatible). However, their claim to have the best aircraft simulation ever looks likely to be true, so we wish them luck. We can't wait to Fly! the finished item soon.

Mungo Amyatt-Leir

Fly! Series 757



Don't push me! Out of 91 actual switches on the 757 overhead panel, the developers expect to have at least 80 fully functional. Amazing stuff

PREVIEW			
Publisher:	Precision Manuals	Price: (estimated)	£19.99
Website:	www.precisionmanuals.com	Expected Release Date:	
Developers:	Precision Manuals		December 1999



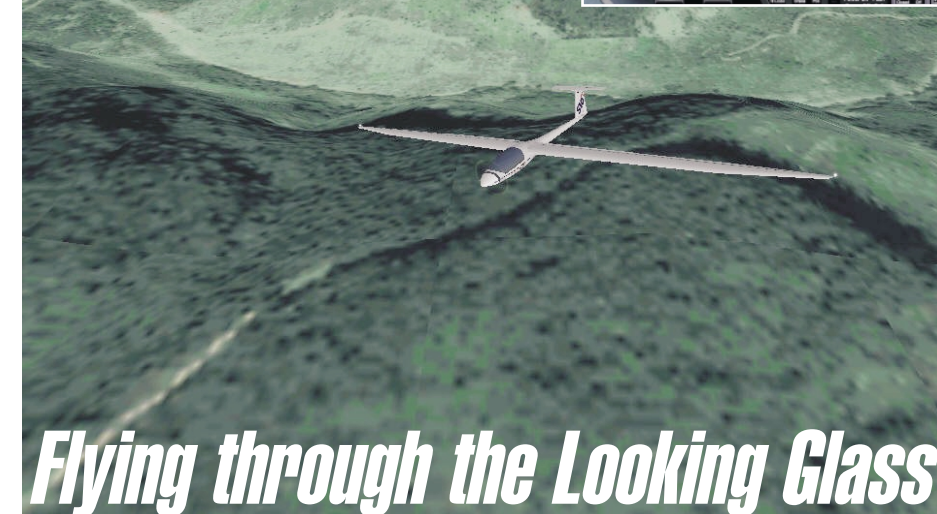
Flight Unlimited III

Now that the dust has settled from the fraught release of Fly! we can turn our attention to the other two contenders for the top flight simulation spot. While Microsoft's biennial Flight Simulator update is guaranteed to take the lion's share of the market, the talented folks at Looking Glass are mounting a strong challenge. Flight Unlimited III builds on the solid reputation of its two predecessors, offering a somewhat different perspective to the all-encompassing approach of Gates' team.

Rather than go for global coverage, Flight III concentrates its efforts right in Microsoft's backyard - Seattle. An area from California up through to Seattle, totalling around 10,000 square miles, can be toured. Owners of the full retail version of Flight Unlimited II can use the existing San Francisco scenery with this update to provide extra detail. While the area may seem limited, it is an area of great natural beauty with plenty of airfields to fly from. Certainly, no other flight simulator can match the graphical rendition of the rolling terrain here. By using satellite imagery of four metres per pixel, an astounding amount of detail is conveyed. From moderate altitude the effect is quite simply breathtaking, although closer to the ground blurring becomes noticeable.

Coupled with the wondrous texture mapping is the high-resolution digital elevation mapping. Subtle undulations in

Soar in silence in the luxury motoglider, but keep an eye out for those thermals



Flying through the Looking Glass

with shorelines revealing light blue shallows against the murkier deep blue sea. The only major metropolis to explore in the area is Seattle, a city with an abundance of character. The unmistakable Space Needle, Kingdome and crowded downtown streets are fun to buzz and look particularly impressive at night.

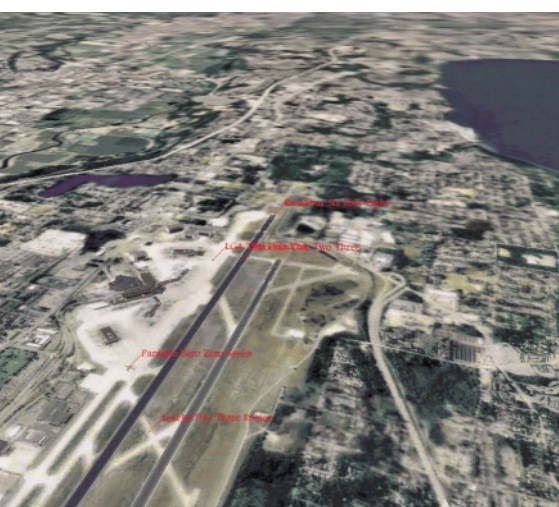
In order to explore the surrounding area fully, there are now ten aircraft to choose from. The trusty single-prop Trainer 172, feisty P-51D Mustang, and Piper Arrow are now joined by the sleek Mooney Bravo and legendary Fokker DR1 triplane. As with all of the aircraft, the panels look distinctly three-dimensional and every bit as good as Fly! and Flight Simulator 2000's. To make them more manageable they are all single screen displays, shying away from the more comprehensive scrollable affairs in Fly. It is clear that Looking Glass is aiming this more at VFR (Visual Flight Rules) pilots who enjoy sightseeing more than procedural flying. To further cater for such flyers, it is possible to use a cut-down panel or full-screen view with tickertape showing vital information at the bottom of the screen.

The Windhawk is still the only twin-prop aircraft included, and is great fun for practicing engine-out flying. Always renowned for the quality of its flight models, Looking Glass has kept their standards up and the Windhawk includes such detail as propeller feathering to reduce drag after losing an engine. To really test the physics engine, hopping into the water-borne Muskrat and new Lake Turbo Renegade 270 seaplane is a must. Cranking up the engines to gather enough speed to start hydroplaning is far more exciting than



Fancy flying in the stylish Mooney Bravo

your conventional take-off. You can even see the spray of the wing wake and splatters of water careering off the windscreen before finally breaking free of the water. Landing is an even trickier affair, and in bad weather will challenge the most experienced of pilots severely.



Work your way around the other traffic, labelled here by hitting CTRL-L

the terrain can be seen, alongside the more spectacular rocky outcrops such as the formidable Mount Rainier. The water effects also blend into the landscape well,

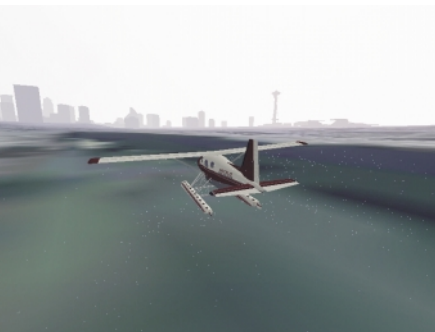


The aircraft include moving parts, but lack transparent cockpits and can appear slightly jagged from some angles

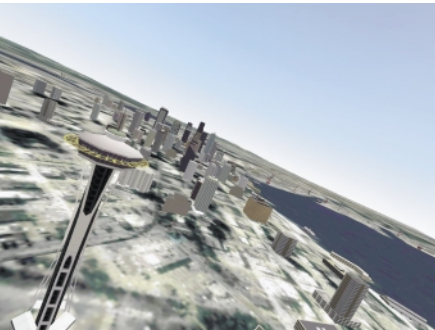
For jet fans out there, the luxurious Beechjet 400A is a real treat. It features a modern cockpit, complete with GPS and weather radar system, to make flying from A to B as quick and painless as possible. Handling is rather sensitive and is a nice



Try out the big blue runway for a change in the Renegade or Muskrat



contrast compared with the docile single-engine props. At the other end of the spectrum to the noisy business toy is the sedate Stemme S10 VT Turbo Chrysalis motoglider. This neat little soarer packs its own small engine to give you a head start finding those thermals. Once airborne and in favourable currents, simply kill the



The towering delights of Seattle. But where's Frasier?

engine and hit a button to fold up the propeller and retract it into the nose cone. Once stowed, the only sound you'll hear is the rush of wind over the canopy as you continue to scour the skies for your next thermal.

With all of this detail, frame rates can be slow without spending significant time finding the right graphical options for you. Luckily, Looking Glass has included a wide assortment of parameters to tweak for the ideal trade-off between detail and speed. On a Celeron 300 with Matrox G200 graphics card and 128MB RAM, around 7-9 frames per second (fps) is average with detail levels set high at 800x600 resolution, rising to around 13-15 fps at 640x480. Sacrificing some image quality allows us to increase performance to an optimum of around 13-15 fps at the higher resolution. Unfortunately the cloud effects have a major impact on frame rates, although the recent patch available on the PC Pilot CD with this issue boasts increases of around 10-25% depending on the machine and flight situation.

For all of its graphical glory, Flight III has two unique features that keep it right at the top of the pile. The new weather simulator is a revolutionary development. Rather than simply setting wind speeds and cloud



Be careful not to overstress the aircraft, or else!

cover, whole weather systems are created that change real-time. Coupled with more accurate modelling of turbulence, the overall feel of flying has never been better. See the 'Who ordered rain?' box to see how this works.

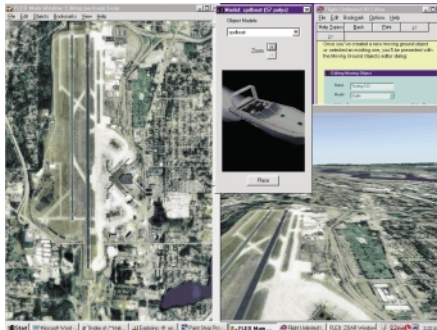
Talk to me...

The other hallmark is the engrossing interactive ATC (Air Traffic Control) system. As with Flight Unlimited II, this is both easy to use and authentic. You are not alone in the skies around Seattle, and at the



The instrumentation is certainly up to scratch

start of every flight other air traffic is introduced. Each other aircraft files a flight plan and continues on its merry way. At busy airports, such as Sea-Tac or McChord Air Force Base, it can be difficult to squeeze a word in edgeways for permission to taxi. At larger airports it can be tricky to find your way to the runway too, but hitting ALT-F12 handily shows you where to go. In addition, some airport diagrams have been made available for download from the Flight III website.



Add your own scenery objects with ease, including speedboats



4 metres per pixel satellite imagery provides staggering levels of detail from on high

Simply sitting and watching the traffic around a busy airport is enthralling in itself

Operating the radio is a doddle, just hit ALT-F to change frequencies. Spacebar activates the radio, and menu items are chosen with the number keys to build up relevant messages before transmitting using the Enter key. This basic but effective system soon becomes second nature, and is the quite simply the best around. The most amazing thing about the ATC and dynamic aircraft implementation is that it is possible to watch and

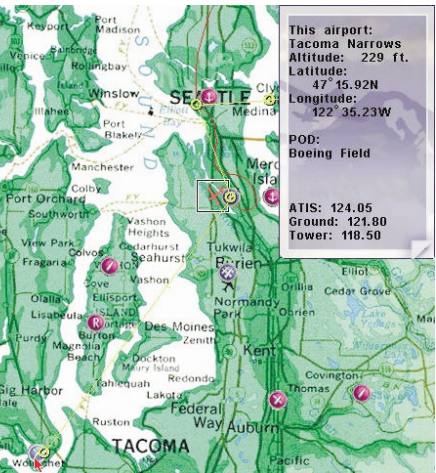


Accurate mapping makes the whole flight experience a lot easier



Clear diagrams in the tutorials describe what you need to know

listen to the surrounding traffic. The radio chatter is not just random background noise either, but consists of real messages from other pilots. The voices themselves all flow naturally, unlike the stuttery sounds in Fly! and there is even a selection of characters to choose from for your own pilot persona. To really see what's going on, hit CTRL-L to bring up labels above aircraft in the external view. Simply sitting and watching the traffic around a busy airport is enthralling in itself. There is a wide variety of other aircraft too, from A-



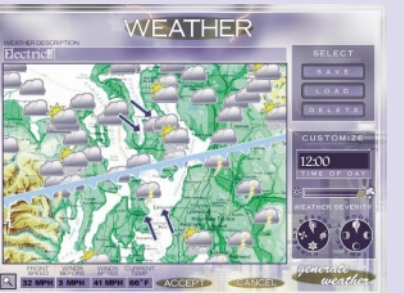
The flight planner is useful, and coupled with the GPS too

10s to Concorde and SR-71s. Unfortunately, there are no Centre controllers to handle transits through airspace, which is a major omission, and IFR (Instrument Flight Rules) ATC directions can be erratic, particularly altitude changes. That said, the combination of an elegant user interface and real air traffic make Flight III by far the most immersive civilian flight simulator around.

For novices and aces alike there are a host of tutorials with detailed lessons on everything from basic manoeuvres to coping with wind shear and finding thermals and ridge soaring. These are well

Who ordered rain?

A major advance in Flight Unlimited III is the complex weather simulator. Rather than manually setting cloud and precipitation levels, you set severity, time and season to let the PC generate appropriate atmospheric conditions. The weather map shows fronts and wind speeds, as well as the usual sunshine and rain symbols that would do weatherman, John Kettleby, proud. The interesting part comes during a flight, as the weather system evolves in a natural way. Varying turbulence levels are also well catered for. Come up to a cloud base and you will be buffeted until breaking through the murk. The rain effects are still second-to-none, with drops splattering and then rolling off the windscreen in a most convincing manner. However, the clouds can look blocky up close and are nowhere near as puffy as Fly! or even Flight Simulator 2000. That said, the dynamic microclimate is a fantastic achievement and enhances the simulation experience enormously.



Not out of place in the Met Office, the dynamic weather is a revelation



Take a crash course in meteorology



Watch out for thunder and lightning

AN ALTERNATE VIEW

Two experts provide their view on Looking Glass' effort...

Trevor Morson:
Unlimited? Hardly as it's limited to Seattle scenery only and a mistake not to include previous release of Flight Unlimited II for the San Francisco scenery area. Hopefully the patch improves the performance issues such as low frame rates. IFR ATC is a little buggy, but the interactive ATC overall, especially for VFR, is very good. It's the best simulator for seaplanes and the ever-popular Muskrat is a joy to fly. It's also great for glider fans with the ability for powered take off.

There is a need for Flight Unlimited III to grow, covering much larger scenery areas, perhaps the 3rd party add-on tools will help. No news yet on an aircraft/panel designer tool, as this would make this release really popular. The flight lessons, video and documentation are good, though missing are regional charts, airport diagrams and approach charts that were provided in previous releases. Finally, Looking Glass provide very good tech support.

Chuck Dome:
This is the most exciting new simulator I have seen in a long time. It represents a quantum leap beyond version II and should immediately be considered as a candidate for 'overall best PC flight simulator'. Most simulators have their strong and weak points but, for me, Looking Glass has done everything right. The scenery, as expected, is absolutely marvellous. The Flight III aircraft are splendidly rendered and their flight models are superb. In addition, the choice of aircraft indicates inspired thinking on the part of the designers. I was impressed by the Beechjet 400 and blown away by the Renegade floatplane. What a supremely enchanting little aircraft! Not only is the plane beautiful and a joy to handle, but it also has one of the best instrument panels I've ever seen. A similar panel adorns the new Mooney Bravo, which is also guaranteed to be a crowd pleaser.

Flight Unlimited III exemplifies something fortunate and rare: a simulator in which all the parts have come together to create a wonderful whole. An unqualified winner!

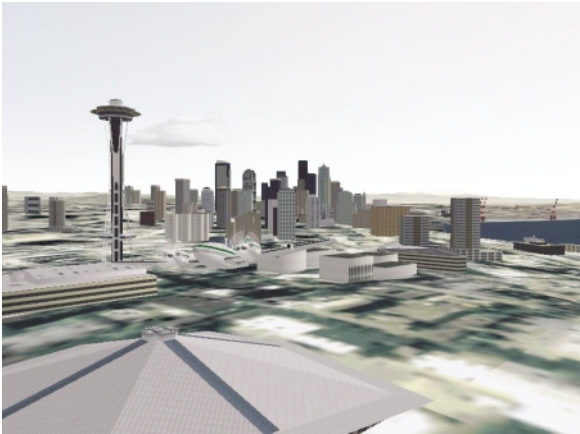
written, with clear diagrams to reinforce important points. For each lesson there is the option to sit in the passenger seat to watch your instructor talk through the exercise. Alternatively you can fly the lessons yourself, with the instructor guiding you through the manoeuvres step-by-step.

To spice up your flying there are several Challenges, analogous to Microsoft Flight Simulator Adventures, most of which require a good deal of skill to even attempt. A tongue-in-cheek mission to steal Gill Bates' Microhard Flight Sim 99-and-a-half simulator and a seaplane sortie to stop a group of villains escaping in a speedboat are two examples of the fun in store. It is also possible to create your own challenges and share them with others.

A major update is 'FLED', a scenery editor with a good selection of objects, from skyscrapers to cows, to repopulate the world with. Dynamic objects can be included too, complete with explicit routes or 'pathing'. A restriction is that airports can only be added in the existing terrain area though. So while the FLED is a major



Digital elevation models beautifully recreate the rolling foothills surrounding Mount Rainier



Downtown Seattle, complete with Space Needle, is deftly modelled

The twin-engined Windhawk is available for hire



ALSO CONSIDER

Software Title:	Flight Simulator 2000
Publisher:	Microsoft
Website:	www.microsoft.com/games/fs2000
Price:	Standard £49.99 Professional £69.99
PC Pilot Rating:	★★★★★

Software Title:	Fly!
Publisher:	Take 2
Website:	www.iflytri.com
Price:	£39.99
PC Pilot Rating:	★★★★★



Panels and super colour mapping make this simulator a formidable competitor to Flight Simulator 2000

breakthrough as a powerful out of the box utility, Flight III still lacks the global capability of the Microsoft simulator.

Overall Looking Glass has produced a fun flight simulation package that is groundbreaking in several ways. The weather modelling is streets ahead of the competition and enhances the feeling of flight enormously. Coupled with the splendid interactive ATC, this makes Flight

Unlimited III the most engrossing simulation package available – and we include Flight Simulator 2000 in that comparison. The inescapable downside is that you are ultimately limited to the Washington area for high-resolution scenery, which can start to feel cramped after a few dozen hours in the cockpit. ■

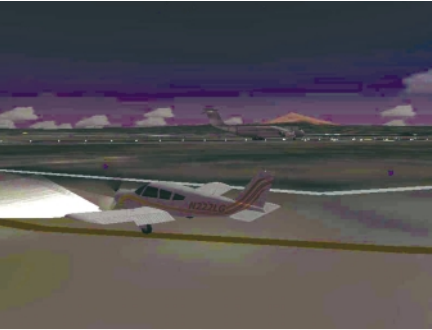
Kenji Takeda



Selecting your aircraft is a snap



Why not create a diary of your flight time by using the log book?



Night time effects are accurately rendered throughout



Some of the most realistic terrain detailing to date is on offer

REVIEW SCORE:	★★★★★		
Publisher:	Electronic Arts	Price:	£39.99
Website:	www.flight3.com	Release Date:	
Developer:	Looking Glass		Out Now
Pros:	Wonderful weather and interactive ATC, coupled with decent flight models and unprecedented scenery detail		
Cons:	Limited high-resolution scenery area, slightly blocky bitmapped clouds and requires a hefty PC with plenty of free disk space		
System Requirements:	Pentium 200, 32 Mb RAM		
Recommended:	PII 400, 64Mb RAM, 3D graphics card		

Flight Simulator 2000

Standard & Professional Editions

Are you a pro?

Microsoft have gritted their teeth and released their eagerly awaited Flight Simulator 2000 (FS2000). Internet newsgroups and forums went crazy with anticipation about the so-called "sim of the year" that was expected to grab you by the hair and shout, "As Real As It Gets". This product is a first in the gaming market where Microsoft has released the same title in two separate versions at the same time.

So what's the big deal about anyway? Is it worth the money? Should you spend an extra £20 on the Professional Edition or stick with the standard version? Does it do what it's supposed to do? Is it as good as our preview last month intimated? We have the answers.

Nice box – but what's inside? Aside from the usual registration forms and money back vouchers for users of previous versions of Flight Simulator, it's good to

see the inclusion of a 320-page manual. No less than three CDs for the Professional Edition are included (the 'standard' has two).

Similar to previous versions, you can have a choice of installations – ranging from 1146 Mb for the full 'custom' install down to a fairly reasonable 360 Mb for the 'compact' option. Opting for a custom install that enabled us to load on the full

contents of the two CDs took around 30 minutes. This is a big installation routine that must update your current version of DirectX to version 7 and then reboot. We experienced no problems with the installation although some users have reported DLL (Dynamic Link Library) errors. This does seem to be a rare problem though. Given the complexity of the product we would recommend you defragment your hard drive (which improves its efficiency).

One notices the long loading time. It's three times longer than in Flight Simulator 98 (FS98), plus the program does a security check on the CD. Once

loaded, the first thing that you notice is the look of the simulator. The interface has been completely redesigned and is a lot more dynamic. So it should be, the interface images take over 11Mb alone!

You can head off and start flying or explore sections that give some background information and lessons.

Before taking your course or check flight you can see a preview video of what to expect. By also following the detailed manual (some 120 pages of the manual are dedicated to the tutorial section) you will learn all the basics of how to

become an airline pilot in no time. We obtained our virtual Private Pilots Certificate in two hours, however we are already seasoned virtual pilots so it might take newcomers a little longer. The only problem we found with this item was the start up position of the aircraft at the beginning of each course or check ride. The aircraft are not positioned correctly on the runway – a problem that occurs elsewhere.

The simplest way to start in FS2000 is to click on the 'Fly Now' button. This takes you to a default start position at Meigs Field in Chicago. This default can be changed at any time by saving any new flight and selecting 'Save as default'.

By selecting 'Go To Airport' you can now select from a list of over 20,000 airports (17,000 more than in previous versions). As in FS98 you can search for an airport by name, code, country, region or city. All the airports have had a facelift with new textures on buildings, runway lights that glow and more objects throughout. Jeppesen provides the data for all the airports, so they should all be accurate in position and detail. Unfortunately, we noticed severe problems with certain features. For example, many ILS localisers (such as Runway 5R at Nice) are way off target to the right. Taxiways, ramps, markings and other features that are available at other airports as standard are also missing. This is obviously an error from when the original data was supplied to Microsoft. We would like to see a fix for this through some sort of patch as soon as possible as it does seriously affect the enjoyment of the product. A classic example of this is at Boston International (KBOS) where the main ramp (about a mile square) is missing.

On a positive note, the aircraft fleet and corresponding flight models are impressive. What you see in the aircraft list depends on which version of FS2000 you purchased...



Very satisfying, despite the annoying examiner!

In the standard version you will receive all the aircraft found in FS98 updated with new features:- Cessna Skylark, Cessna 182, The Boeing 737-400, Sopwith Camel, Learjet, Bell 206B helicopter and Extra 300S and Schweizer 2-32 Sailplane with the addition of Concorde (endorsed by British Airways) and the Boeing 777-300.

In the Professional Edition you will get all the above plus the KingAir 350 and Mooney Bravo plus two high resolution, extra large instrument panels for the Mooney and Cessna Skylark. It's a tough call as to whether these are worth the extra £20.

Each aircraft comes with detailed information both in the help system and within the checklist. The checklist can now have information copied and pasted into it and it's now called the 'Kneeboard'. Every aircraft can have its identification plate changed, e.g. from the American style N1997 to a more familiar UK G-BOAC.

All these aircraft, in both versions, have updated flight models, textures and flight dynamics. The sounds are superb with correct start-up and shutdown sequences instigated by a simple key press. The Professional Edition provides the option to replace the default sounds with high quality recordings available from the CD.

All the aircraft have new lighting effects and pilots sitting in the cockpits. The Commission for Equal Opportunities has obviously had a word with uncle Bill, as one of the pilots is a lady! The jets have rotating turbofans that wind up and down (in turn) just like the real thing. The props have amazing start-up and shutdown



John and Martha King from King Schools help us getting started. Nice hair-do!



A comprehensive set of lessons and check rides will help you become a professional pilot



With a similar interface to FS98, selecting airports is a familiar process

sequences that you could sit and watch for hours. Animated landing gear effects are superb and one can see wires and braces inside the gear housings. Even the steering gear can be seen moving whilst taxiing.

Both versions of Flight Simulator 2000 include a flight planner. The flight planner window, like the whole of FS2000, has sound effects when you click on the various part of the interface. Select your favourite departure, arrival and alternate airports and then decide on a cruising altitude (although this has no effect when flying with autopilot).

When planning your flight you can select a Direct Route, Established Airways or VOR (navigation beacon) to VOR. The flight planner then generates a route and displays it such a way that you can easily overlay other airports, airways, intersections, VORs and NDBs (non-directional beacon). If you want to know more about a particular waypoint you simply click on it and its information will be displayed. You can also add it to your plan if it's not incorporated already. The other attractive feature about this flight

After you have saved your flight plan, it is automatically patched through to a GPS (Global Positioning System) and 'Moving Map' that is incorporated into, and can be accessed by, all the aircraft in the fleet. Then GPS can then fly the entire route for you automatically by selecting 'NAV' in the autopilot. Waypoints in the map view are duplicated in the GPS. It is also possible to choose a direct route to the nearest waypoint and change your flight plan at any time (if you desperately need a 'comfort break' or more beer).

Jeppesen, the publishers of real-world aviation charts, has supplied all the navigation data for Flight Simulator. This is great, but some intersections and Low and High Altitude Airways in the database seem to have problems and prevent the flight planner generating routes. This is especially noticeable when trying to generate flight plans greater than 700 miles. This could be a localised bug or a limitation but we shall see if Microsoft corrects this in a rumoured patch. We hope so,



Bell 206 showing off its fresh new livery and flight model. See the new textures on the buildings at Heathrow?

planner it is that you can 'rubber band' your flight path by clicking on the route and dragging it to wherever you like. It's completely interactive. Scrolling across the map is also possible by simply moving your mouse to the edge of the window, where it will change to an arrow, you simply click again and the window moves down for viewing other sections.



Real Pilots use EFIS (Electronic Flight Information System). This is similar, if a little basic

because at present if you want to fly from London to New York, you can only generate a direct flight and then manually insert waypoints between your departure and arrival airports.

One annoying feature we discovered with the flight planner is that when you have generated a flight plan you are immediately moved from your parked position (that you saved as a scenario) to the runway you set in your departure airport. We would have liked to see a facility that gives the user an option to choose whether this happens or not as most pilots like to start away from the runway.



You can change the ID number on all the aircraft. This is our toy.. the PC Pilot Cessna!



16-bit blending of colours create amazing backdrops

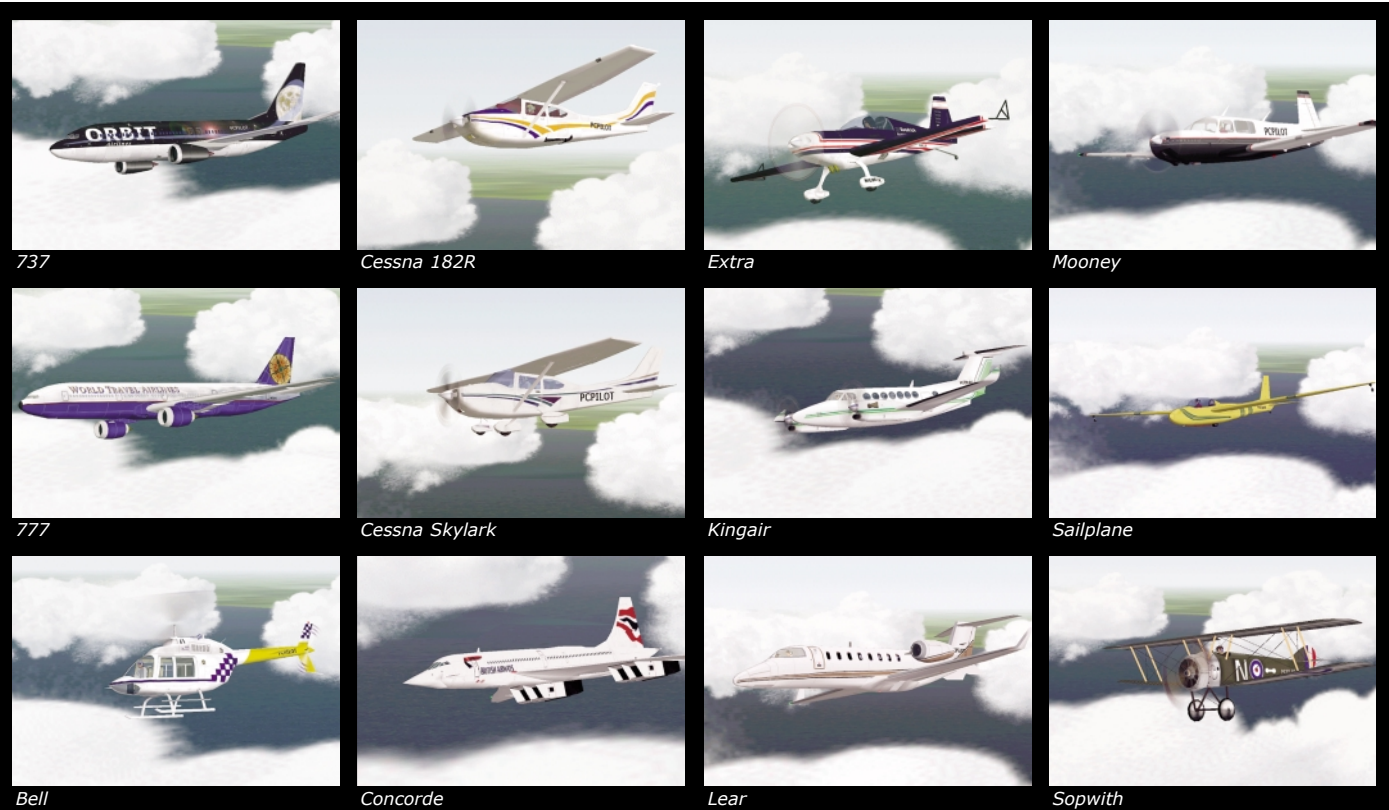
The weather system is vastly improved. You can have as many clouds, wind, and temperature layers as you like from 0 to 100,000 ft. Using volumetric effects, the clouds are now fluffy. Rain, snow and thunderstorms are possible with some thumping good sounds to go with it. However, it would appear there are bugs here too. After creating a cloud layer above 10,000 ft, flying above and then passing back through this layer, users have experienced zero visibility that does not clear. It is suspected that this problem could be due to different graphics cards.



London looks better than ever before. Check out the shining caps on the props of this KingAir 350



The flight planner is an excellent addition to Flight Simulator with much potential



The entire fleet include updated glass effect panels with varying resolutions for accuracy. These panels look excellent and are much better than their predecessors. However, all have a generic bug causing problems elsewhere with the display mechanism. This is probably caused by the HSI and OBI gauges. These gauges have a different refresh rate to that of the main outside view. This causes stuttering or hesitation when turning the aircraft. This stuttering can be alleviated by turning off the panel window or by totally disabling the gauges in the settings dialogue. A real shame and an annoying defect, especially for those with slower PCs.



Complicated enough for you? These are Concorde's main and sub panels



The KingAir 350 panel rivals many other simulators in its class

YOUR PLANE AWAITS

The main new feature of the weather system is the inclusion of 'real' weather. Simply get online and download METAR weather data from a dedicated Internet server, updated every 15 minutes by Jeppesen. This is an exciting feature as

you can receive the weather more or less as it's happening.

Every time a new simulator comes onto the market one of the first questions that is asked is, "What's the scenery like?".

FS2000 has a remarkable revamped scenery engine. Instead of either 256 or 16bit colours, FS2000 can now handle 16 bit and 32 bit textures at resolutions of up to 1280x1024. As a result the scenery is stunning.

The Airport Facility Directory has now been replaced with 'Map View'. This is an extremely powerful interface that allows you to click on any part of the screen to bring up information about waypoints



'Rubber band' your flight path to any waypoint in the current view



With the inclusion of real weather, you may never need to use this dialogue box



The Alps. It's views like this that make FS2000 a formidable package

So, what's the difference in scenery depending on the version of Flight Simulator 2000 you purchase? Virtually none. In the Professional Edition you get a further six detailed cities: Boston, Washington DC, Seattle, Berlin, Tokyo and Rome. However, with so much great freeware scenery available you may decide that the six extra cities do not match the price premium.

Buildings have been completely updated with new textures for both night and day. The sun now shines and the moon glows. Ground textures, are better (but not perfect). Dynamic aircraft have been given a facelift with textures but the major difference is the introduction of 'digital elevation mesh' scenery. Hills now roll, rivers flow and mountains undulate naturally. The world in Flight Simulator is no longer flat, but has millions and millions of elevation points that depict the altitude of countries, towns and cities. Unfortunately, again more problems are noticeable. With the introduction of elevation points, some roads now float above hills in places, as do rivers and even airports. This is especially noticeable in the Alps where there are lots of undulations. One airport is even underground!

Scenery from FS98 can be imported into FS2000, but only after modification to the FS2000 'scenery.cfg' file. Simply put, for every piece of FS98 flat scenery you want to import you have to flatten FS2000's scenery

by creating a switch. No doubt as third party developers get working on new projects these issues will be overcome.

Using all of the scenery features in FS2000 comes at a severe price: probably a new PC, unless you are running a Pentium III 650, a ninja 32 Mb 3D graphics card and 256 Mb of RAM. The fact is that you cannot realistically run FS2000 with everything turned full on. Microsoft swears that FS2000 can be run on a Pentium II and a minimum of 32 Mb RAM. Yes, it can, but only with the settings turned right down. Most people will be disappointed with this. They have a right to be, but on the other hand everyone said the same about FS98 when it first came out. Within a year everyone had his or her settings turned right up to the max and wanted more.

Realistically we understand that Microsoft has had to provide a product that will use next year's technology and beyond. We are told that FS2000 is optimised to work well with Pentium III technology. That's a minimum of a 450Mhz processor. See the box on FS2000 frame rates for more details on what you can expect.

The Professional Edition includes an aircraft editor. This is paradise for those interested in such things and one that is important to virtual pilots who know their aircraft backwards. This utility enables users to add and delete aircraft. It can edit panels, textures, sound files and change the flight dynamics of any aircraft in FS2000. This feature, if sold separately as an add-on package, would cost you at least £25 in the shops. It compares to and could even equal other specifically designed rival aircraft editors such as the original Flight Shop. If this feature is your bag then the Professional Edition is easily worth the extra cost.

The manuals that come with FS2000 Standard and Professional editions are excellent. They have been carefully put together for the person who really wants to learn the basics of flying and navigation. Rod Machado takes nervous novices and shows them every step to grasp the basics of

FS2000 FRAME RATE TEST

The frame rate of a flight simulation is very important when working out the quality of the graphics you are displaying.

So how do you know what a good frame rate is? Well, imagine watching a film at the cinema. That film is displayed at 25 fps (frames per second). Now imagine that film shown at 12 fps. It would appear to have breaks, stutter and not run smoothly. That's exactly what we are looking for here. The following gives you idea of what is acceptable when frame rates are quoted:

- 30 = Excellent
- 25 = Good
- 20 = Average
- 15 = Below Average
- 10 = Very Poor
- <10 = Forget it.

Over 100 different users performed the following frame rate tests on FS2000 using the same flight situation:

Meigs Field (Default Start Up position); full screen mode; image quality set to 5; daytime.

As you will see, the results are varied but very interesting. We have included a selection here to give you a good idea of how your system might cope with FS2000.

flight. In fact, some promotional videos are included on the third CD of the Professional Edition featuring Rod Machado, Cessna and King Schools.

The aviation articles are faultless, providing comprehensive information about flight, navigation, aircraft engines and systems. Other subjects covered are the AOPA, aerobatics, weather, safety and emergency procedures and provide a valuable insight for the budding trainee. You will also have to

Chuck Dome:

My experience with Microsoft Flight Simulator goes way back to version 3.0. Since then, each new incarnation seems to have significantly improved upon the previous one. Sadly, with FS2000 this no longer seems to be the case. Although it's not a bad simulator, it comes nowhere near what I expected, given the quality of FS98 and Microsoft's Combat Simulator. I suppose any great product will eventually become mediocre through over confidence. For me, it has happened with FS2000.

The most obvious problem is the slow frame rate. Many theories have been advanced to explain it, some quite comical. The simplest, however, is that someone didn't care. Many new simulators are displaying great graphics at good frame rates; why not FS2000?

Provided courtesy of www.simflight.com where the full list is available.

CPU (Mhz)	RAM (Mb)	Video Card	Resolution	FPS
166	24	Voodoo 2 PCI 16 MB	800x600	8
200	64	TNT PCI 16 MB	1024x786	12
200	96	Voodoo Banshee PCI 16 MB	1024x786	10
233	128	Voodoo 3 PCI 16 MB	1024x786	6.5
233	32	None	1024x786	3
233	64	Voodoo 3 PCI 16 MB	800x600	13
266	64	Voodoo Banshee AGP 32 MB	1024x786	24
300	64	Voodoo Banshee PCI 16 MB	1024x786	10
300	64	RIVA 128 Embedded 32 MB	640x480	7
300	64	Intel740 AGP 8 MB	1024x786	11
300	128	TNT2 Ultra AGP 32 MB	1280x1024	13
330	32	Matrox G400 AGP 32 MB	640x480	5
333	512	Voodoo 3 AGP 4 MB	1280x1024	11
333	128	GeForce 256 AGP 32 MB	1024x786	22
350	384	TNT2 Ultra AGP 32 MB	800x600	68
350	128	Voodoo Banshee AGP 16 MB	800x600	16
400	128	TNT2 Ultra AGP 32 MB	1024x786	22
400	128	RIVA 128 AGP 8 MB	1024x786	15
400	128	Voodoo 3 PCI 16 MB	1024x786	20
400	128	Matrox G400 AGP 16 MB	1024x786	27
400	256	Voodoo 2 PCI 16 MB	800x600	8
433	128	TNT2 AGP 32 MB	1024x786	21
433	256	TNT AGP 16 MB	1024x786	16
450	128	Voodoo 3 AGP 16 MB	1024x786	19
450	128	ATI RAGE PCI 4 MB	800x600	17
450	128	TNT2 Ultra AGP 32 MB	1280x1024	13
450	256	TNT2 Ultra AGP 32 MB	1024x786	22
450	128	Voodoo 2 PCI 16 MB	1024x786	20
450	256	TNT AGP 16 MB	1024x786	19
450	64	Voodoo 2 PCI 32 MB	800x600	15
450	128	ATI 128 AGP 16 MB	1024x786	16
450	128	RIVA 128 AGP 8 MB	1024x786	18
450	128	Matrox G400 AGP 32 MB	1024x786	23
450	64	Voodoo 2 AGP 16 MB	640x480	10
450	128	Voodoo 3 AGP 16 MB	1024x786	19
500	128	TNT2 Ultra AGP 32 MB	1024x786	11
500	128	Voodoo 3 AGP 16 MB	800x600	25
500	128	Matrox G400 AGP 16 MB	1024x786	22
550	256	Voodoo 3 PCI 16 MB	1024x786	22
550	256	TNT2 Ultra AGP 32 MB	1152x864	40
600	128	TNT AGP 16 MB	1024x786	25
600	128	TNT2 AGP 32 MB	1024x786	26
600	512	GeForce 256 AGP 64 MB	1024x786	57
600	256	TNT2 Ultra AGP 32 MB	1024x786	24
650	320	TNT2 Ultra AGP 32 MB	1280x1024	38
716	320	GeForce 256 AGP 64 MB	1920x1200	98

fight your way through discounts on Flight Safety International add-ons, flight training video offers and samples and a discount of a CD ROM training package from Cessna.

FS2000 in both its editions is without doubt the most significant release since its predecessor. The Professional Edition is

worth the extra money. Just. The extra aircraft, scenery, aircraft editor, training programs and manuals are worth the extra £20, but only if these extras interest you. It is a great shame that significant bugs are present in the release, it smacks a little of a rushed release to make the Christmas market. Based on experience with FS98 we expect that, despite Microsoft's denials, there will be a patch or patches to fix the problems.

Remember also that many retailers are offering FS2000 for silly money. We saw some online retailers offering the Professional Edition for £40 against the RRP of £70. Take account of the cash-back offer for existing FS98 users and you have a true bargain. Unless of course you need to buy a new PC to run it! Actually, you can get away with a reasonable Pentium II 266 system; though do not expect miracles with the frame rates.

There are so many features that make up Flight Simulator 2000 that we are still discovering them today. We like FS2000. A lot. It has its faults, but no other product can provide you with such a comprehensive and realistic experience when run on the right PC. ■

Mike Clark

AN ALTERNATE VIEW

Our two resident gurus give their own personal view on Microsoft's latest...

Trevor Morson:

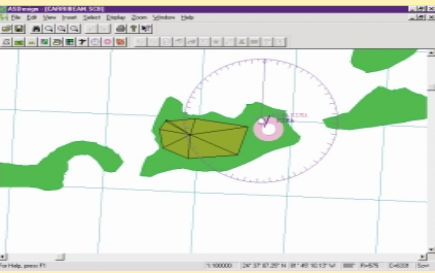
"Patience" and "winner" are two words you should keep in mind when buying this package.

Patience: You may notice a few scenery anomalies such as missing rivers, tarmacs or buildings. It is likely that 3rd party software will improve such things. The world is a big place and the entire scenery engine was redesigned using true elevation. Do not play the numbers game by tracking frame rates. Use your eyes to experience smoothness during flight. Ideally, you need a decent PC

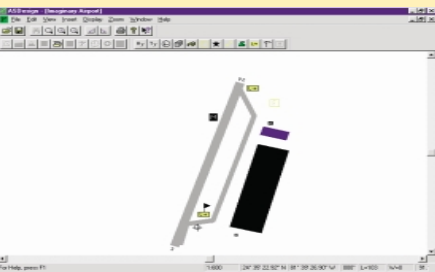
set up, with a good video card, sound card and upwards of a Pentium II. Be sure to update your video drivers. There are many options in the display settings to suit your PC and you will need to use them.

Winner: Typically, this is the future of our hobby, and it is very bright. Microsoft have released a good open-ended flight simulation program that says, "Here I am, load anything you want into me, change me anyway you feel, and I will give it back to you via your monitor exactly how you like it". An excellent program for the price, you will learn to fly an aircraft from the Glider to the Concorde, worldwide, in a realistic environment. This is what FS2000 is all about.

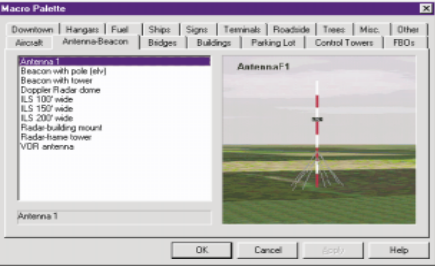
AND ON THE SEVENTH DAY...



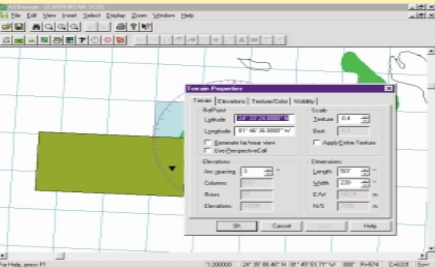
A new island comes to life (an imaginary Key West)



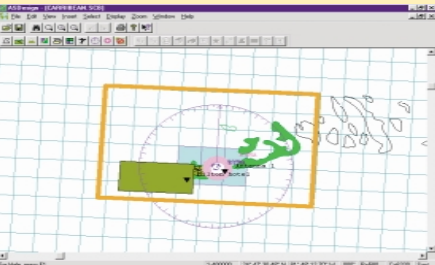
Adding more detail to the airport



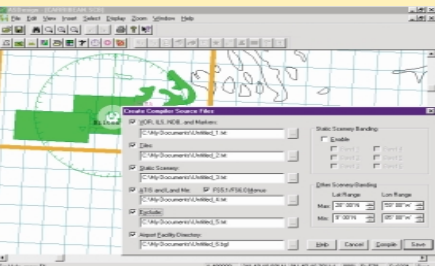
The Macro tool – selecting the 3D antenna



Laying out a 3D mesh (the brown patch at 8 o'clock)



Defining the 'exclude area' borders (in orange)



The scenery is ready for compilation!

Airport & Scenery Designer 2

Build your own scenery. Not for the faint hearted!

If you are interested in creating a more realistic flying environment in Microsoft Flight Simulator then probably the most difficult part is scenery design. Your project might involve anything from the addition of a few simple objects up to full scenery design including ground textures, 3D objects, airports, nav aids and dynamic scenery.

There are roughly two types of scenery – 'flat' ground type with polygonal 'mountains', and 'mesh' ground scenery (as now seen in Flight Simulator 2000). The flat ground type can use pre-defined 'synthetic elevated tiles' to simulate ground elevation, coastlines, and other ground features. The number of different tile types is limited. The result is limited scenery that looks good at low altitude but very bad as you go higher. The more advanced flat ground designs involve textured polygons created either manually or by using coastlines, rivers, lakes, roads, cities based on accurate information.

The mesh type scenery is the most accurate and it is usually built by overlaying a satellite or aerial photography on an imaginary mesh formed by connecting elevation points of a Digital Elevation Matrix (DEM). Depending on the DEM resolution, you can create very accurate photo-realistic results that follow real 3D ground contours.

The 3D DEM and 2D coastline data can be freely downloaded from the US Geological Survey (USGS) web site but free satellite and aerial photographs are more difficult to find. This type of data costs serious money, however you can still find 10 year-old low-resolution files on the web if you look hard enough.

Today there are several scenery design applications around. If you are looking for an almost complete and professional tool, you cannot go wrong with a new release of 'Airport & Scenery Designer' (ASD2) from Abacus.

ASD2 does everything apart from dynamic scenery. ASD2 covers all types of scenery design approaches including polygonal coastlines and features, synthetic tiles and 3D DEM scenery. It reads special coastline and elevation data

files from USGS data. ASD2 also provides a visual airport editor that allows you to accurately lay runways, taxiways, 3D objects and other ground features in the immediate vicinity of an airport. To complete the package you get a comprehensive set of high quality 3D textured objects to place anywhere in your scenery.

ASD2 creates scenery for Flight Simulator 98 and Combat Flight Simulator. Compatibility with Flight Simulator 2000 goes as far as Flight Simulator 2000 supports its predecessor's scenery format. Abacus say they are studying the new features available in '2000 and, if significant, will add them to a future patch.

ASD2 is not for the beginner – it is a sophisticated, professional tool aimed at people who know what they do and who understand Flight Simulator and its scenery system. For those willing to invest some time and learn, Abacus provides an excellent 180-page manual full of valuable information, tutorials and guidelines on scenery design.

If you know what you are doing then ASD2 is a winner. It is widely used by professional scenery developers worldwide. However do not enter this territory if of faint heart.

Alexander Lawrence

REVIEW SCORE:

Publisher: Abacus

Website: www.abacuspublisher.com

Developer: Peter A. Jacobson

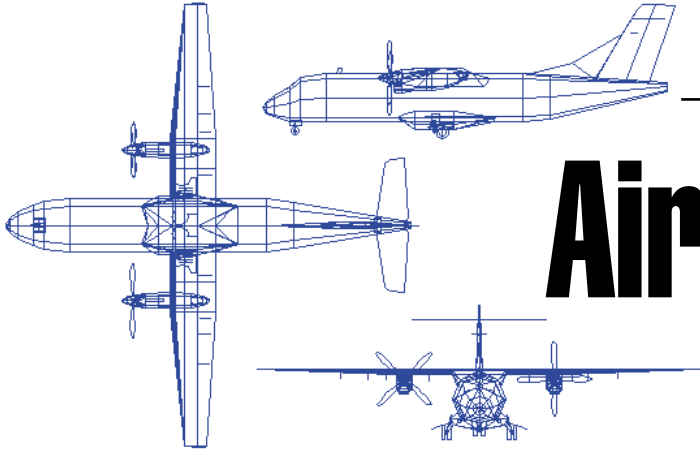
Price: £39.95

Release Date: Out Now

Pros: Excellent features set. Excellent manual. Visual airport and scenery layout. Comprehensive set of 3D objects.

Cons: Not for novices.

System Requirements: Pentium 100, 32Mb RAM.



Aircraft Animator

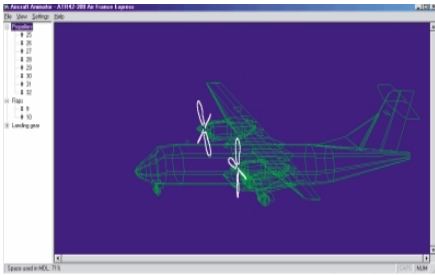
Tweaking your parts!

Have you ever downloaded an aircraft from the Internet or purchased an add-on that looks great but lacks the detail you strive for? Do you feel that the planes you have lovingly collected for years are sub-standard because their gears won't retract smoothly, landing lights never come on or the flaps fail to extend? Most of us crave this precision, but animation effects are rare and until recently have been difficult to get hold of, especially if you have no Internet access. However, don't despair, the answer could be at hand.

Abacus, the leading publisher in 'FS Tweak' products has made it possible for all of us - experts and novices alike - to take any Microsoft Flight Simulator aircraft and manipulate them to render professionally sequenced moving parts by using a new, simple and extremely effective utility called Aircraft Animator.

There are two different ways it can be used, with either the Animation Wizard or Manual modification.

Once you start the Animation Wizard, the program takes a long hard look at the workings (the flight model or MDL) of the aircraft you have chosen from your Flight Simulator Aircraft folder. A summary of what can be manipulated is displayed and you have an option to select the parts you want enhanced. It is possible to change flaps, spoilers, gear, landing lights, propellers and other 'tagged' parts. Having got over the initial shock of suddenly becoming an aircraft engineer, you can then make your selection. The results are instant and initially very satisfying. Unfortunately these effects are sometimes generic, fairly uncharacteristic of the real thing and not realistic to the trained eye. However, once this technique has been mastered, moving up a level and tweaking your aircraft manually can achieve better results.



Full 3D preview of the animation – see the parts move before flying it "for real"

documentation explains everything so clearly and concisely that if your first plane isn't in the air within two hours you need to go back to school or have your PC examined!

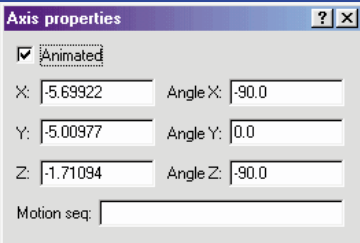
Once you have decided that your bird is ready to fly the nest, you can preview the chick in a dedicated 3D window before taking it out for an inaugural thrashing in Flight Simulator. This is a nice touch in our view, because it saves time opening and closing programs.

This package also includes two fully animated sample aircraft, the Concorde SST and a BK-117 helicopter to give you a glimpse into what this baby can really do.

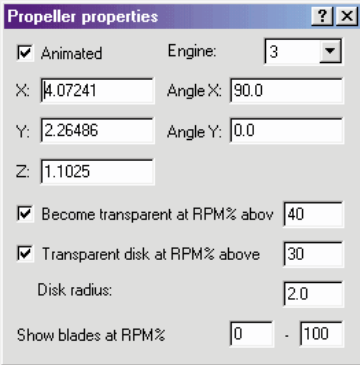
Aircraft Animator is a helpful add-on that should be clearly labelled and occupy a handy position in your CD rack. It gives novices or experts a platform to update their existing fleet to another level of realism. If, for example, you have the VIP Classic Wings series of CD's, it will convert them perfectly and effortlessly.

This one is a winner - a utility that could become a classic. If you don't believe us, check your parts now!

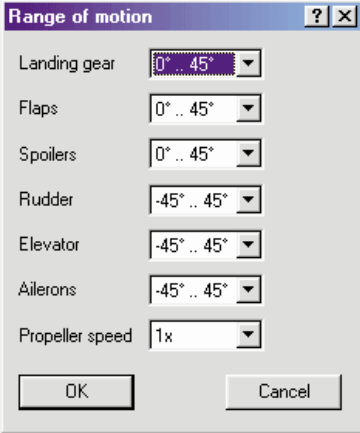
Mike Clark



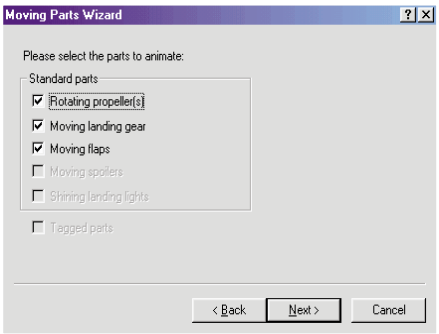
Advanced motion commands – you can sequence animated parts so they move in harmony with each other



Control the three continuous stages – idle, revved-up and full RPM



Complete rotation angle control – decide by how much each part will move



The "hit" list of parts that can be animated – the greyed-out ones cannot be manipulated

When editing your favourite aircraft manually, you can delve deep into the moving parts. A decent manual teaches you the fundamentals of transforming your plane to Hot-Rod standard. Flaps, spoilers, gear and propeller speed can all be tweaked again and again until you achieve a unique and pleasing result. At first, manual editing seems a shade daunting to someone who hates mathematics, but if you know a little about degrees and co-ordinates you should have no trouble at all. The printed

REVIEW SCORE:

Publisher: Abacus

Website: www.abacuspublisher.com

Developer: Konstantin Kukushkin

Price: £34.99

Release Date: Out Now

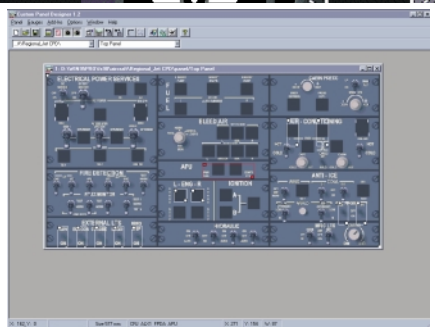
Pros: Easy to use. Clear and concise Manual. Manual editing options are easy. Good value for money.

Cons: Will not add woofers horns or go-faster stickers to the fuselage. Will not increase the size of your parts!

System Requirements: Pentium 100, 32Mb RAM

Custom Panel Designer

Your own panel factory!

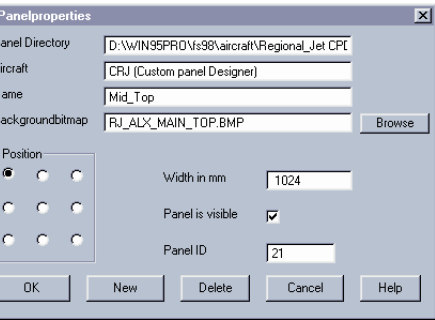


Laying gauges on the upper panel of a CRJ. Drag and drop makes things easy

New aircraft for Flight Simulator 98 and 2000 are available as never before. You can now pick up free aircraft found at many popular Internet sites. The aircraft can be great, but many of these freebies do not have cockpit panels supplied with them. Of course, you can download panels from the Internet too but for simplicity and personal preference, some people prefer to build their own.

This is where a program called Custom Panel Designer comes into it's own. A simple utility from Abacus that can provide quick and easy panels based on designs and choices you make.

Only 30 pages populate the manual that is clear and concise from the moment you turn the first page. Thankfully using this utility is simplicity itself. There are three main steps to creating a decent looking panel.



Deciding on a background location

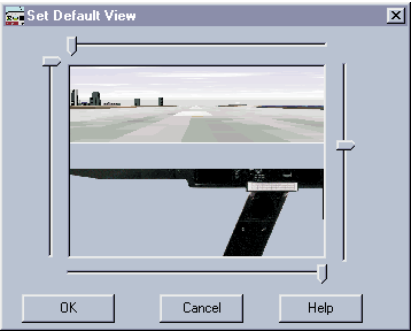
First you must design or scan a panel background (surround) using a fairly decent graphics package such as Paint Shop Pro (our recommendation) or any other similar package.

The second step is to assign the panel to an aircraft found in your Flight Simulator aircraft folder.

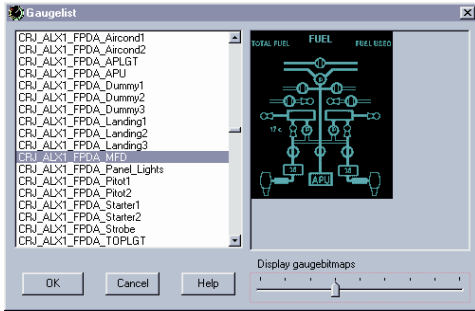
Next, select the background you prepared and start populating it with gauges – either the standard Flight Simulator items, or from the additional set that are provided with Custom Panel Designer. The gauges are positioned simply by dragging and dropping them onto the background you made earlier. You can also resize them at the same time.

The package supports multiple panels – overhead, engine instrument panels, MFD (multi-function display) modes and so forth. You can select any switchable panel for gauge location and layout instructions. In other words, everything is operated with point-and-click and mouse drag operations. We would have liked to see the names and other data of gauges provided with a tip-tool. This can help when working on complex panels with dozens of gauges.

Flight Simulator 98 has a limited number of colours that can be used with panels - 32 actually. Because of this limitation panel design, up until now, has been a long drawn out process. You would have to pick your colours carefully to achieve the best results. This could take hours for complex designs. Custom Panel Designer is clever because it is able to analyse the colours you choose to make your background and fit them nicely into the limited palette.



Positioning the outside 3D view. Another easy to use feature



The gauge viewer and selector tool. You can clearly see where everything is



The final result. The quality is as good as any commercially produced panel

The final step in creating a panel is deciding on the size and location of the 3D outside view. Again, a simple interface is provided which is simple to use. Dedicated horizontal and vertical sliders helps render the correct result.

Custom Panel Designer is aimed at non-programmers who want to easily customise panels. It is also aimed at panel developers who want to take the pain out of gauge sizing and layout. This utility is very easy to use and works well with Flight Simulator 98 and Combat Flight Simulator. However it does not offer the advanced features technical whizzes might crave. One might also doubt its attractiveness given Flight Simulator 2000 Professional Edition now provides a very similar tool as standard.

Alexander Lawrence

REVIEW SCORE:

Publisher: Abacus

Website: www.abacuspub.com

Developer: Stefan Geissler

Price: £29.99

Release Date: Out Now

Pros: Easy to use. Good definition tool for dealing with FS98's limited 32 colour palette. Good tutorial to panel customisation.

Cons: Lacks more sophisticated features for the advanced user. Could do with a bit more optimising in performance.

System Requirements: Pentium 100, 32Mb RAM.



Dash 7 taxiing for takeoff. Notice the landing Mooney and the busy helipad in the background



As busy as it gets!

When Microsoft coined the phrase "as real as it gets" it forgot one important thing – in real life you are not alone in the sky and its Flight Simulator airports are rarely "as busy as it gets".

Earlier versions of Flight Simulator have seen the basic inclusion of dynamic scenery with non-textured, toy-like airplanes and ground traffic populating some airports. More recently, third-party developers have learned to animate textured objects. Unfortunately both of these methods suffer from deficiencies: the dynamic scenery is specific to a location and the textured animated scenery takes up a lot of disk space.



Even helicopters, ground vehicles and historical aircraft can be converted into dynamic scenery

The designers of FS Traffic have provided an amazingly elegant solution to the default lone skies that Flight Simulator provides. FS Traffic reads airport information directly from Flight Simulator's scenery data and generates automated air traffic for all existing airports.

FS Traffic lets you convert any Flight Simulator 98/2000 aircraft (including third party planes) into a dynamic object and make it take off, land, fly around or



It all starts here – note how you can set a minimum frame rate and the number of aircraft you see

FS Traffic

otherwise populate any airport. There are still some limitations: FS Traffic cannot convert animated aircraft and only Flight Simulator 'standard' airports with ILS can enjoy the automated dynamic scenery. Third-party scenery that can be accessed only through the 'Flight Simulator 6.0 or earlier' option in Flight Simulator's scenery menu are not populated automatically and must be set-up manually.

The results are visually impressive yet do not seem to sap performance. FS Traffic detects your aircraft's location and generates ATC and traffic only if you are within the radius of the dynamic scenery. Fine-tuning options allow you to decide how many dynamic objects you have at a time, the radius of action, traffic density and set minimal acceptable frame rate.

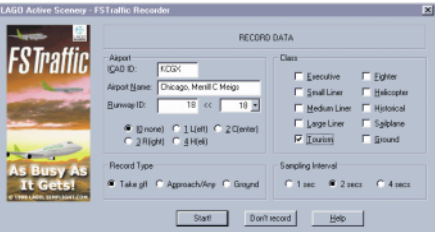
You can also record your own paths (referred to as 'tracks') for aircraft to follow and even record voice messages that will sound at various stages. Annoyingly you cannot edit tracks. FS Traffic assigns types of aircraft to tracks rather than specific ones saving disk space and making it easier to exchange tracks with fellow simmers. The track recording is very useful for those third party non-populated airports.

Encouragingly, the publisher Lago is providing ongoing support for FS Traffic (at www.fstraff.com). They have already fixed a number of reported bugs and seem committed to reacting to users feedback and wishes. They also provide a demo version for you to try out. (on this issue's CD-ROM too)

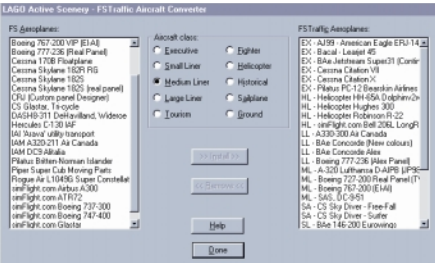
This is a product that we cannot recommend highly enough. It is cheap,

easy to use, Flight Simulator 2000 compatible and only if you are determined hermit will you not appreciate the immediate improvement to your simulation skies.

Alexander Lawrence



When recording tracks you can set many options for maximum flexibility and tight playback



Assign a category to the aircraft you convert. They play back correctly according to runway length and class e.g. a 747 will only land on runways longer than 10,000 ft

REVIEW SCORE:

Publisher: Lago

Website: www.fstraff.com

Developer: Lago & simflight.com

Price: €19.99 (euros)

Release Date: Out Now

Pros: Extremely easy to install and operate. Really does bring airports to life. Specific dynamic scenery recorder. User customisable – see your preferred aircraft as dynamic scenery

Cons: Does not populate many third party airports. Does not convert all 'moving parts' or animated aircraft. 'Tracks', once recorded, cannot be edited. Can only be purchased by download and registration.

System Requirements: Pentium 200, 32 Mb RAM

Electra!

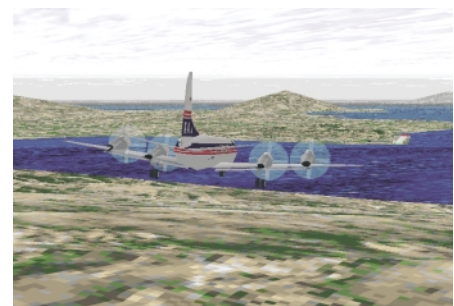
Propeller job

Bill Schulz is well known for his passion about the Lockheed L188 Electra, as we saw in the first issue of PC Pilot. His Electra designs originally appeared about two years ago in VIP Classic Wings 98. Now he has done his own thing and released a program dedicated solely to the L188 in The Cielo Company's 'Electra! Flying Alaska and The Aleutian Islands in the Lockheed Electra'.

Electra! is on two CDs and installation is relatively simple, if slightly unusual, with the need to access some features through your web browser. The installation is divided into three sub-routines that install an 'access' program and icon on your desktop, the slideshow and viewer software and, if you have Flight Simulator 98, the aircraft and panels.

Electra! is set up to interact as a web site and is compatible with both Microsoft Internet Explorer and Netscape Navigator browsers. By selecting 'Electra.htm' from the main page and clicking on the hyperlinks you can navigate to any part of the CD.

Initially, the supplied Aleutian situations come up with no local scenery, which could be more than a little disappointing. However, closer investigation showed us that the install routine had placed the Aleutians scenery folder 'FS98_Aleut' into



Gear and Flap placement is accurately reproduced



The liveries are excellent throughout and this RAA L188 is no exception

the main FS98 directory. Simply moving the folder into the FS98 Scenery sub-directory and running the "add scenery" routine from within FS98 (World/Scenery Library/Files/Add) restores the dramatic local scenery. Something one should not have to do with a product like this.

If you enjoy flying in relatively wild country Electra! is for you. The seven different airline liveries of the L188 are well designed and look realistic. American, National, North West, Reeve Super Aleutian Airways, Varig, KLM and



The video provides some grainy but dramatic footage, such as this approach to Dutch Harbour

Eastern are all accurate representations of their real life counterparts.

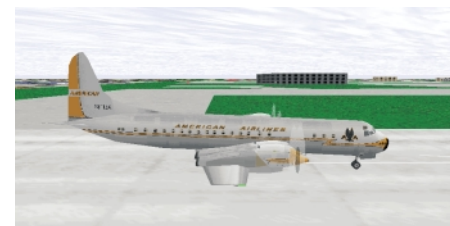
We tried flights from different Alaskan/Aleutian locations (both included in this package). The Electra flew like a dream, with rate one turns held all the way round and it rolled out exactly on time. The autopilot held it in the various flight configurations, including heading holds, altitude holds and coupled ILS approach. The only aspect we would question is the accuracy of the acceleration rate. From brakes-off to 120 knots took 12 seconds and then the acceleration wound the speed up to 250 knots in only 28 seconds – a little too lively perhaps?

The instrument panel is an absolute joy. Clear and readable with everything in its right place, even a weather radar screen on which the rotating green cursor and panel lights are nicely subdued for night flying. The instrument knobs and switches can all be operated with a mouse.



Clear and accurate panels give this Electra a formidable edge. As seen here on short finals at Sand Point, Alaska

The CD also contains a selection of sectional and approach charts in .jpeg format that can be printed, as well as tutorials for some of the more hairy and exotic destinations. Playing the sample videos shows flying at its best and weather at its worst! A set of over 200 digitised photographs compressed into 10 screensavers is included too. A selection of these stunning images was featured in the last issue of PC Pilot.



Watch the power of those workhorses! 0-120kts in 12 seconds!

Forty minutes of cockpit videos are supplied, including take-offs, approaches and landings at primitive strips. These are a bonus that any air enthusiast should have in their collection.

Overall Electra! is a detailed and well rounded package that has much to offer Flight Simulator users, though it is perhaps rather overpriced for all but true prop fanatics.

STOP PRESS - as we went to print we heard that the product had been updated and improved for Flight Simulator 2000. Though these improvements have not been tested by us we understand that the aircraft now features moving parts and improved exterior modelling. Quick work by Bill! ■

Tony Hawes

REVIEW SCORE: 	
Publisher: The Cielo Company	Price: £29.99
Website: www.flight1.com/cielo/	Release Date:
Developer: The Cielo Company	Out Now
Pros: Good flight model. Great images and video. Also includes charts and tutorials	Cons: Incorrect installation of scenery. Only for those who like the Electra Expensive
System Requirements: Pentium II 266Mhz, 32Mb RAM, 24x or faster CD-ROM.	

Flanker 2.0

Not just another shoot-em up!

The best carrier representation around. Really clean crisp graphics

Designated Flanker, the Russian built Sukhoi SU-27 is one of the most accomplished combat aircraft in the world. The characteristic twin tail and swan neck design has become a familiar sight at air shows around the world and made the Flanker a fixture at events like Paris and Farnborough.

Developer, Eagle Dynamics, have succeeded in bringing Flanker 2.0 to the PC flight simulation arena using an extraordinary programming team, all of whom are Russian. Many of those who helped with the project actually worked for Sukhoi and even the original test pilots assisted the developers. Nick Grey, project director and owner of Eagle Dynamics, is not from a software background, but his other job is managing director of the Fighter Collection based at The Imperial War Museum, Duxford. This team flies many of the famous World War II aircraft seen at displays. With such wide aviation experience in the group behind the making of Flanker 2.0, we naturally expected a realistic and interesting product and we were certainly not disappointed.



Looks like we need to bail out here!

Flanker 2.0 is primarily a combat simulation and it allows the user to control an aircraft that very few pilots will have had the opportunity to take for a spin. Everything is centred on reality, from the modelling and handling of the aircraft to the SAM (Surface to Air Missile) simulations.



When loading this product, you will find a simple yet innovative install sequence. Along with the normal questions about where you would like to store the program, you are also asked what type of computer you have. The three choices are Minimum (Pentium 200, 32Mb RAM, 4Mb 3D card), Recommended (Pentium II 300, 64Mb RAM, 16Mb 3D card) or Smokin' (Pentium III 600, 128Mb RAM, 32Mb 3D card). When you have made your choice and the loading has finished, the options menu is already set to your PC's requirements. Nice.

Starting Flanker 2.0 on a slower PC takes some time. Unlike most simulators, 3D objects, land textures, surface areas, roads, rivers and sounds are all loaded at once.

However, the advantage of this method is that once everything has loaded the simulation does not have to constantly cache (read) from the hard drive. Valuable processing power is released and the performance of the program stays smooth, stutter-free and hot!

The menu system has eight learning areas and 'Instant Combat' is possibly a good place to start getting used to the feel of the aircraft. This is an arcade style setting that allows you to choose your preferred scenario from a list of air-to-air, air-to-ground, anti-radar or anti-shipping. There are 30 different aircraft to fly against and 91 ground units, such as tanks, buses and even coach passengers! The anti-radar setting

ALSO CONSIDER

Software Title:	Falcon 4
Publisher:	Microprose
Website:	www.microprose.com
Price:	£34.99
PC Pilot Rating:	
Software Title:	Mig Alley
Publisher:	Empire
Website:	www.empire.co.uk
Price:	£34.99
PC Pilot Rating:	



That's the one that got us. Well at least his vehicle looks good

can place you against 14 different units as well as ships. With 26 of these it could take many hours to try and annihilate them all.

Within the Instant Combat menu your survivability can be changed from Realistic to Immortal. Initially, it might be a good idea to try the Immortal setting and get familiar with how this amazing aircraft flies. It's also fun trying to slam it into the ground and we used this mode to learn the flying envelope of the SU-27. Flanker 2.0 is one of the only combat simulations with extremely accurate flight dynamics. We understand that the development team were given access to classified information for research during the five years it took to complete this project.

To see how good Flanker 2.0 really was we subjected it to some rigorous testing. Starting off from the airfield, we applied full afterburners and hurtled off down the strip. At V1 (take-off speed) we rotated and she lifted off from the runway with surprising ease. The power-to-weight ratio was amazing and pulling straight back on the stick fired the aircraft up like a rocket. With enough altitude to start manoeuvres we brought the throttle all the way down to idle and she carried on in a vertical climb.

SIM MEETS REALITY



This is the real Nick Grey on the right after a flight



Vladim in real life

Flanker 2.0's representation of Vladim



The Real Sevastopol



Sevastopol represented in Flanker 2.0

Some combat simulations claim that their flight dynamics are so good that they are used by the military. However, they often fall down as soon as a stall test comes along. In this respect Flanker 2.0 is different. Just prior to stall speed there is a little buffeting effect that becomes more pronounced the closer you get to the stall. Then, as the speed has bled right off, the nose of the aircraft pitches to the side creating a downward arc and the altitude begins to drop.

The next severe test we tried was the spin. Inducing a spin is very easy and this must be remembered when in combat. To make the aircraft spin, we applied full after-

burners, pulled in as sharply as we could and went into a very tight high-G turn. As soon as the maximum angle-of-attack voice warning kicked in, we cut the throttle and applied a slight nose-down attitude and opposite rudder. Once the spin had been attained we went to the outside view, which showed a spectacular scene of an aircraft falling out of the sky. If you are very good, you can even place the aircraft in a flat spin (remember Tom Cruise in Top Gun?). This is one of the hardest attitudes to correct but it is possible to pull out if you can centre the stick, apply full throttle, push the nose down a little and then apply rudder to pull out.

Despite the accuracy of the flight model and the abilities of the enemy, the Instant Combat option is too similar to a game in our view. If you are looking for accuracy in a combat zone then the Campaign Editor and Mission Zone is where you will want to spend your time. The Missions menu has five pre-prepared scenarios: Air-to-Air, Air-to-Ground, Air-to-Ship, Head-to-Head and a Mystery section. Most types of fighting include average or hard missions, depending on your acquired skills and there are around 60 combinations.

Flying a mission involves some skilled combat techniques, so it is probably a good idea to read the manual as well as flying the training missions. The developers have spent a lot of time programming the AI (artificial intelligence) of opponents and with all the aircraft and missiles having their own accurate flight models, the result is a very comprehensive and challenging fighting arena. Fantastic terrain mapping, taken from previously classified Russian satellite imagery, enhances fast, low flying over the ground to avoid radar. The feeling of speed is very realistic and the scenery details are so accurate, that if you actually knew the area, you would have thought you were there. Houses and other landmarks have been skillfully replicated and these can all be attacked.

Most missions only involve a specific type of combat so for example, in air to air sorties you only attack aircraft and on anti-shiping missions there are naval targets that must be engaged. Multi-role missions can be set up through the mission editor.

If you ever finish all the missions included, you can try your hand at making your own missions with the built-in editor. A map of the area is provided, upon which you must place your own weapons and those of the enemy forces. If you want to try flying into the heart of an enemy airbase but feel that hopping over there is all too easy you can add SAM



Missiles Away! Great exterior views whilst in flight add to the fun



The Editor Screen. This is easy to use and with so many functions it is very useful

placements and fighters that will hunt you down. Then, instead of landing at your home base, you could request aircraft carrier support. The carrier landings are fantastic. For added fun, weather can be set. Try including a hazy mid-morning with a heavy crosswind component and try to survive! With such a flexible editor program you can also save these mission files and upload them to the Internet so your friends can attempt to fly your own maddening missions!

As with most titles these days, multiplayer support is included. You can duel with up to eight of your friends in the skies over the East. Roger Wilco, the popular voice communications software, is included in the package. This enables multiplayer communications over the Internet to be conducted similar to a two-way radio. If your system supports this program, using the voice interface you can actually talk directly to your wingman and the other players, instead of typing messages.

All in all Flanker 2.0 is an excellent program. The complexity of the flight model, combined with stunningly accurate scenery makes it incredibly realistic. There are many hours of excitement to be had. This is one of the few combat packages worth calling a simulation. ■

Jean-Luc Neale

REVIEW SCORE: 									
Publisher:		Mindscape		Price:		£34.99			
Website:		www.ssionline.com		Release Date:					
Developer:		SSI				Out Now			
Pros: Realistic flight models Excellent scenery and textures Carrier landing system is fantastic					Cons: To fly with all detail turned on means upgrading to a 32 MB graphic card and a faster CPU.				
System Requirements: Pentium 200, 32Mb RAM, 4Mb 3D graphics card									
Recommended: PIII 450, 64Mb RAM, 16Mb 3D graphics card									

FLANKER 2.0 COMPETITION



Win Your Own SU-27 Aircraft! (well a stunning scale replica). Or one of four copies of Flanker 2.0

This issue sees the release of combat simulation Flanker 2.0 from Mindscape. This simulation places you as the pilot of one of the Eastern Block's most impressive all-round combat platforms, the SU-27.

Conceived in 1967 when the threat of the cold war was in mid crisis, the SU-27 was designed as a long-range interceptor to replace the SU-15, TU-128 and the Yak-28P, as well as attempting to out-do the United States famed F-15s. After a difficult beginning, where the second prototype



The model of the SU-27 in blue and grey camouflage sits on its own pedestal and would look great on anyone's computer desk. Even better though, whilst looking at the expensive model that could adorn your desk you will be able to fly the simulator itself.

One fortunate reader will win a rare 1/45-scale model of the SU-27 and a copy of Flanker II for their PC! Four luck runners up will win a copy of the program. All you have to do is answer two questions... do your research carefully!

- 1: The SU-27 uses two AL-31F engines to power the aircraft into the skies. How much thrust does each of these engines produce?
- 2: With that huge amount of power the SU-27 can carry quite an impressive load. What is the maximum take-off weight of the SU-27? (answers in kilograms please)

Please send in your answers on a postcard or on the back of an envelope to:

Flanker 2 Competition
PC Pilot
PO Box 3002
Brighton
BN2 2BZ
United Kingdom

Or e-mail: mail@pcpilot.net, marking the subject Flanker 2.0 competition.

Please make sure you clearly state your postal and e-mail address. We will make a random draw from all correct entries received. Competition closes 15th January 2000. Entries received after that date will not be included in the draw.

crashed due to a complete control systems failure and major design problems hampered performance and stability, the aircraft was redesigned.

This redesign turned the plane from a sitting duck to a world record breaking aeronautical masterpiece. Between 1986 and 1988 one of the prototypes was stripped of all unessential equipment and prepared for aviation records, with retro fitted engines. The aim was to capture records held previously by the F-15. 27 actual records were broken, including many time-to-height records.

After joining service with countries like the Ukraine, India and China, the manufacturers, Sukhoi, decided to improve on the aircraft and six variants were produced (see box opposite for details).

The SU-27 is one of the prettiest of fighting machines; the swan-necked nose and sleek wing design make the aircraft a beauty to behold and it has always been loved at air shows around the world.

PC Pilot and Mindscape are offering one lucky reader the chance to actually own an SU-27. Well OK, it's a model, but it's a fantastic prize nonetheless! ■

SU-27 Variants

SU-30

Formerly the SU-27PU the SU-30 is optimised to fly on missions in excess of ten hours and acts as an airborne mission controller.

SU-30MK

This is an updated version of the SU-30 with up-rated navigation and weapons systems. The SU-30MK is often used as a precision-guided platform and can fire missiles up to 75 miles away from a target.

SU-33

Formerly the SU-27K this is the naval variant of the SU-27. It has canards to help improve the take-off and landing characteristics. This aircraft also has a shorter tail cone to reduce the chances of a tail strike during high angle-of-attack landings. The SU-33 is a true multi-role aircraft, as it needs to provide attack and defence capabilities well away from a home base.

SU-34

This is a two-seater long range day and night fighter/bomber. First flown in 1993 the aircraft, like the SU-33, has canards to improve manoeuvrability, but has a longer tail cone, which may house an aft facing missile guidance system. The aircraft also has an up rated cockpit with some glass panels being fitted. The oddest part though is that this aircraft is designed for comfort. It has a toilet and sleeping facilities onboard.

SU-35

Probably the best-known variant due to the number of air shows that have been visited by this aircraft. The SU-35 has a completely new glass cockpit, which means that all of the systems are shown digitally and that the old analogue displays have been updated.

SU-37

Like the SU-35 the SU-37 is another popular air show performer and with the new thrust vectoring engines that are designed to improve low speed flying characteristics, the pilots show off some absolutely amazing aerobatics in this new aircraft.

Precision Pilot

The advanced navigation and approach trainer

The vast majority of flight simulation enthusiasts are knowledgeable and dedicated amateur pilots who are just as serious about their simulated flights as the chosen few who occupy those real-life cramped cockpits.

To achieve this level of competence is no mean feat, particularly when you consider the complexities of the radio navigation instruments found in modern aircraft. It can also be rather daunting for a beginner. Luckily help is on hand with the launch of this interactive tutorial.

But instrument flying entails much more than understanding the instruments themselves. You also need to be aware of holding patterns, point-to-point navigation, NDB and ILS procedures. Fortunately Precision Pilot covers these subjects with the same clear-cut style.

Exercises let you put into practice what you've learned so far. Once again you have a comprehensive range of options, such as completing randomly generated radial intercepts and ADF (Automatic Direction Finder) tracking. Or perform the mental



The EFIS has an easy interface that helps you grasp the system from day one.

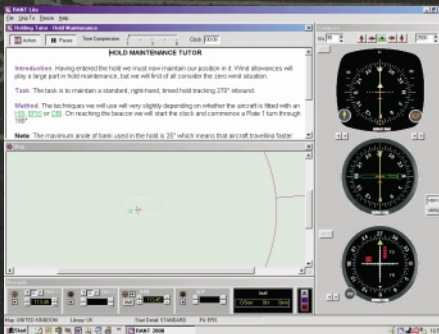
The program was developed by Oddsoft Ltd., and is derived from RANT 2000 a

product that's been used for many years to train real pilots from organisations such as British Aerospace, Flight Safety, the Royal Air Force and other notable organisations.

Precision Pilot deals with all aspects of instrument flight training. Basic descriptions of each instrument and their component parts are followed, in most cases, by fully animated demonstrations of their usage in typical procedures. The developers have made excellent use of graphics to explain these elements, something that the dry text and illustrations you'll find in conventional textbooks cannot achieve.

Take for instance the tutorial based on the HSI (Horizontal Situation Indicator). The screen is split into three sections. The largest window displays a textual description, complete with various hypertext links that activate options like the heading bug and CDI (Course Deviation Indicator). These automatically change the readouts on the graphic representation of the instruments on the right hand side of the screen. Finally there's a small panel along the bottom that shows the current nav-aid readouts.

There are similar tutorials for every other instrument, including some military equipment such as the TACAN (Tactical Air Navigation).



Every part of the flight's action is covered. Notice how the radio and essential gauges are included to help you understand and correlate each section of the flight

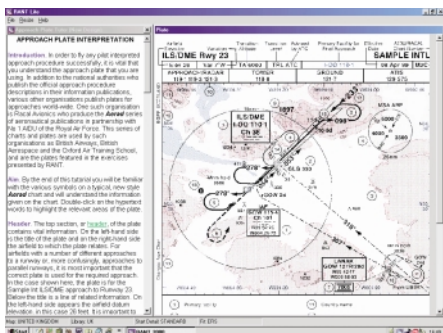
gyrations needed to calculate drift, or the conversion of TAS (True Air Speed) to IAS (Indicated Air Speed) - something that is quite difficult to do while flying a plane in IFR (Instrument Flight Rules) conditions.

Having successfully reached this stage however, you can go on to create your own scenarios in order to practice any of the techniques you've mastered. The practice procedures are completed with the help of the genuine April 1999 Aerad map database, together with a few sample approach and departure plates.

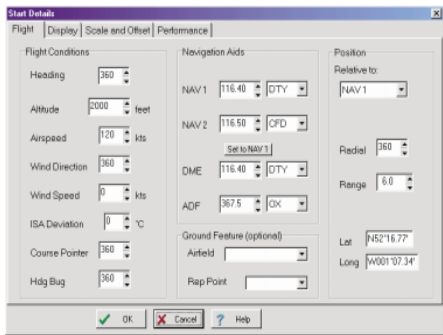
The only downside is that Precision Pilot offers no special interaction with programs such as Flight Simulator or Fly!, though conversely this does make it ideal for all types of flight simulation or even real flight training.

Overall Precision Pilot is the most comprehensive computer-based instrument flight trainer we've seen and manages to cover this most complex subject in a manner that is both concise, yet easy to follow.

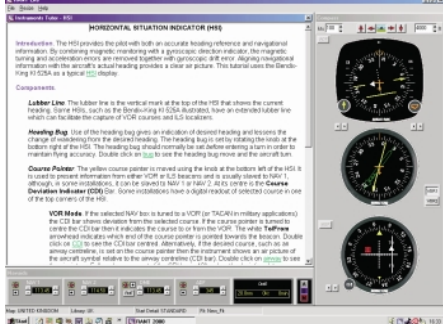
Joe Lavery



Clear and concise. Each part of the tutorial is described in easy-to-follow detail



The many options that make this IFR trainer a serious piece of kit



The HSI. One of the more difficult gauges to understand. Clear instructions take you through each element in a language that even your cat can understand

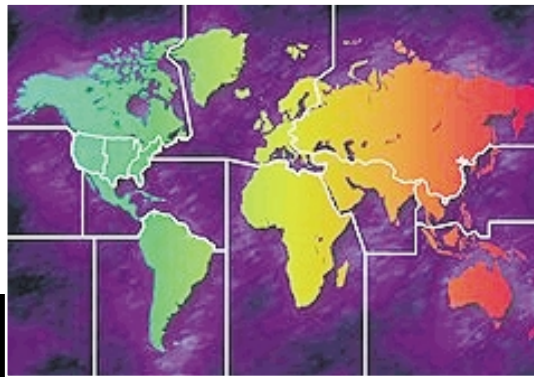


Different displays help the learning curve. A Terminal Approach at Exeter shows how they contrast

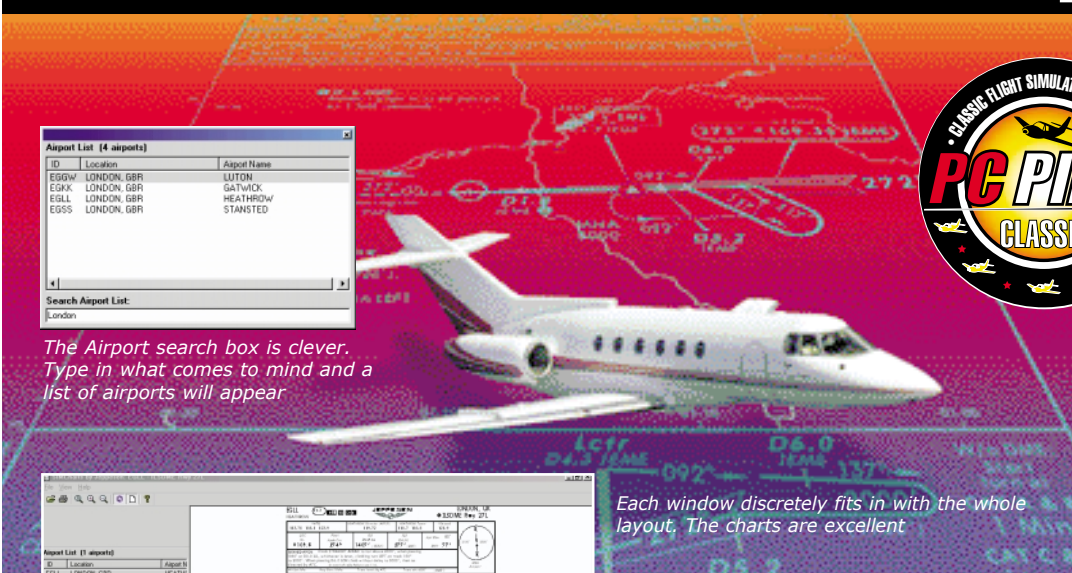
REVIEW SCORE: 			
Publisher:	The Associates	Price:	£34.99
Website:	www.flightsim.co.uk	Release Date:	
Developer:	Oddsoft Ltd		December 1999
Pros: Offers the most comprehensive flight training outside the sphere of real aviation Suitable for all flight simulation programs (and real pilot training!)		Cons: Not for the casual user. Requires a high degree of concentration and dedication to become proficient. No special integration with your flight simulator.	
System Requirements: PC 486 or better, 16Mb RAM			

SimCharts

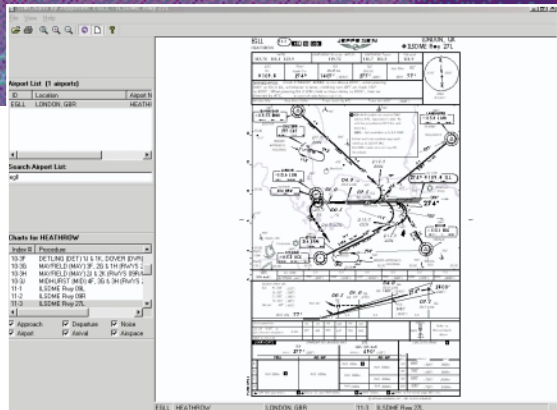
£6,000-worth of Charts for £20? Are we joking?



Twelve regions with over 3500 charts in each!



The Airport search box is clever. Type in what comes to mind and a list of airports will appear



Each window discretely fits in with the whole layout. The charts are excellent

If you were to purchase a single paper Jeppesen chart, such as an airport diagram, it would cost at least £1.99. So what if we told you that with SimCharts there are well over 3,500 charts in each region and they only cost £19.99? Would you be amazed? We certainly were.

SimCharts has been released to coincide with Microsoft Flight Simulator 2000. In fact, there is a demo version included with Flight Simulator 2000 Professional (and cunningly on the sample CD that comes with this issue of PC Pilot). However, SimCharts can be used in conjunction with other stand-alone simulators such as Flight Unlimited III, ProPilot ,Fly! and others.

...these are genuine charts

In a nutshell, SimCharts are a series of 12 CD-ROMs (each sold separately) covering the entire globe. The series is divided into Eastern, Central and Western United States, Canada/Alaska, Latin America, South America, Pacific, South Pacific, Eastern Europe, Europe, Middle East/Asia and Africa. Four out of the twelve regions come as "combination packages" which include printed en-route charts for each area covered in Eastern, Central and Western United States and Europe.

Between you and PC Pilot, these are essentially genuine charts. Some information may be slightly out of date, but on the whole they are the real thing. Though

we are legally obliged to say that, THESE CHARTS ARE NOT TO BE USED FOR REAL WORLD NAVIGATION.

On the single CD-ROM you will find a fast set-up routine that installs the necessary 'browser' to view the contents of the disc. For this review we used Europe, which includes 3556 individual charts covering a square area from western Greenland to eastern Italy. During installation the charts are not copied to your hard drive and you must insert the CD each time you want to search for a plate.

When starting the program you are presented with a main window and sub-views (Airport Search, List Box and SimChart List Box). By typing either an ICAO (International Civil Aviation Organisation) code or the full name of an airport, you are automatically presented with a list to select from. Clicking on your chosen airport brings up a list of corresponding diagrams in the charts sub-view. We also noted that the reference number for the full printed version is provided should you be interested.

When selecting an Approach, Departure, Noise Abatement Procedure, Airport Diagram, Arrival or Airspace chart (each of which can be deselected for speedier search) the program reads from the CD-ROM and displays the chart. This can be navigated around, zoomed in or out of and printed.

A comprehensive glossary is provided as part of the help system and this alone represents good value for money.

A simple, cost effective and essential addition for the serious simmer. Jump in your Lear jet and buy it now.

Mike Clark

REVIEW SCORE: 			
Publisher:	Jeppesen GmbH	Price:	£19.99/29.99
Website:	www.jeppesenpcpilot.com	Release Date:	
Developer:	Jeppesen GmbH		Out Now
Pros: Excellent value for money. Data works hand in hand with FS2000 and other sims. Provides ALL the information a simmer will ever need!		Cons: We hope Jeppesen know how much money they are losing by providing these!	
System Requirements: PC 486, 32Mb RAM, 300 dpi printer			
Official UK Dealers: Associates: www.flightsim.co.uk & Transair: www.transair.co.uk			

Fly Lauda

Formula One takes to the air

The compelling link between flight simulation and reality is perhaps what drives all armchair aviators to push themselves towards their limits. With this in mind, Papa Tango has teamed up with airline entrepreneur and racing legend Niki Lauda to bring the intricacies of his fleet operations to Microsoft Flight Simulator 98.

Aptly titled Fly Lauda, that is indeed what is required. However, a good understanding of the operation is in order before becoming a fully-fledged member of the Lauda Air crew, and the 100-page manual provides all of the necessary background to put you on track. More of a brochure than a manual, the slick folder contains a lengthy history of Lauda Air, together with particulars of the company's ethos and technical specs of its fleet. This makes for interesting reading, although more useful are the copious numbers of charts for Vienna airport and the navigational details for the 15 flight adventures. To add spice to the package, it is bursting with Lauda Air paraphernalia such as a 1999 timetable, gift catalogue, promo leaflet and even a pen – gimmicky, but who doesn't need more pens?



Enjoy the Austrian architecture while navigating the taxiways at Schwechat

As a pilot for Lauda Air you'll be seeing plenty of your homeport, Vienna Schwechat. And what a joy to behold this is. Papa Tango claim to have it mapped down to 1/4 metre



ATC and real-life don't always match, keep your eyes peeled for other traffic that the tower may have missed



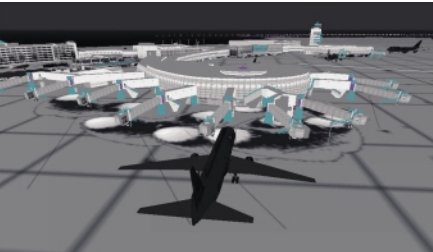
The 767 cockpit is nicely rendered, but only looks the part at 1024x768 resolution



Use the Safegate/AGNIS docking system for inch perfect gate positioning

resolution, with every building reproduced inside and out. Cranking up the scenery complexity confirms this and sidling up to the gate reveals a staggering level of detail. Not since Airport 2000 have we seen such meticulous modelling. To add to the atmosphere there are hordes of ground vehicles scuttling around the tarmac. Everything from tankers and coaches to marshalling cars and baggage trolleys can be seen going about their business. Taking up rather more room are the other airliners coming in and out of Vienna. Most importantly, of course, are Lauda Air flights arriving and departing from the West Pier of the airport. Other native airlines, such as Austrian, Lufthansa and British Airways also contribute to the ground traffic, making the whole place come alive. Of course, the downside of all this activity is that the frame rate slows down dramatically, making this add-on wholly unsuitable for lesser PCs.

The flight adventures aim to represent typical routes flown by Lauda Air and include short hops to Munich and Geneva, as well as longer excursions to and from London Gatwick and Amsterdam Schipol. The start-up weather and time is set randomly to make life more interesting and increasing re-playability value a little. Fly Lauda's adventures really come to life once the radios start warbling. By using ATC (Air Traffic Control) vocals recorded from Vienna tower, every voice is authentic helping to make the hole experience a



Textureal 2 night lighting for round-the-clock operations

believable one. There is ample variety in the background chatter, although the dynamic scenery traffic and radio messages don't tie up at all. This can cause serious headaches, for example it is quite a shock to be cleared for a take-off role only to see a jumbo on finals coming straight at you and have another jet literally up your tail.

It is possible to use any aircraft for these adventures, although the natural choice is either the 737 or 767 in Lauda Air colours. The interiors for these are clean and functional, with nice overhead panels and a cacophony of sounds recorded from inside the real aircraft. Coupled with the ATC, this makes for an immersive cockpit experience.

It's a shame that more aircraft and scenery are not included given the price, as the rendition of Vienna airport is lavish and possibly the best of any add-on to date. For a more complete experience you'd have to also purchase Lauda 425 and Austria Professional (to be reviewed next issue), leaving little change from a hundred quid. For the same money Airport 2000 offers more.

Kenji Takeda



Enjoy a supreme view and watch the world go by

REVIEW SCORE:

Publisher:

Papa Tango

Website:

www.papatango.com

Developer:

Papa Tango

Price:

£29.99

Release Date:

Out Now

Pros:

Vienna airport teems with life. Atmospheric and engrossing set of RealATC adventures with authentic voices.

Cons:

High detail gives poor frame rates. Includes only two aircraft. Dynamic scenery and ATC don't tie-up at all. Limited scenery coverage.

System Requirements:

Pentium 200, 32 Mb RAM

Recommended:

PIII 350, 128 Mb RAM, 3D graphics card

BEFORE USING THESE TUTORIALS

Know How Your Sim Operates.

How you operate your flight simulator program is up to you. Some flight simmers use simple joysticks. Others use advanced twist-grip sticks. Some rely entirely on the keyboard. A few flight simmers actually use yokes and rudder pedals. Our instruction assumes that you know how to operate your flight simulator program and you are familiar with its controls. If you are not, then do so now and return to your flight lesson when you are ready.

Fly One Step At A Time.

We hear from many flight simmers that want to skip over the basics and challenge themselves with heavy aircraft and instrument flight right off. While this is a great luxury of flight simulation, it deprives them of the skills they need for meeting advanced challenges. When encountering situations for which they are unprepared, flight simmers frustrate themselves with poor performance such as sloppy landings and even crashes. We strongly advise doing everything one step at a time and building your skills toward the next levels. That is one of the reasons why these lessons start at the basics!

Use These Tutorials For Flight Simulation Only!

These tutorials are intended for flight simulation. No matter how much the programmers try to make their aircraft, panels and sceneries realistic, there are certain limitations to the program that cannot be overcome. As examples, the outside views are computerised depictions through windows that are about the size of a typical business-letter envelope. There are no truly peripheral views, and the only way to see left or right is to manually change views, which is considerably more awkward than simply turning your head. The aircraft performances are not fully realistic in every detail. The joystick, mouse and keyboard operations are not realistic - real-world general-aviation pilots don't use them to control their real-world aircraft. While we have made every effort to make our tutorials as realistic as feasible, we have adapted them out of necessity to the limits and nuances of flight simulation, so some aspects cannot and do not apply to real-world flight. Therefore, we caution everyone to use these tutorials for their intended purposes, and we accept no liability for anybody's misuse of them.

PLEASE NOTE: We have created this series to be applicable to a variety of simulators - Microsoft Flight Simulator, Fly!, Flight Unlimited, etc. However, the instruction has been based on Microsoft Flight Simulator as this is by far the most popular simulation in use. If you do not find the instructions or features we mention in your favoured sim, we apologise, but hope you will be able to adapt the tutorial as required.

Flight Sim Training

Professional instruction with Bill Stack

VFR (Visual Flight Rules) Tutorial

Part 2

Flying from London City (EGLC) to Stansted (EGSS)

For this VFR tutorial, we will fly from London City airport along the River Thames to Stansted Airport. The objective will be to navigate visually from one airport to another, maintain straight and level flight en-route, join the destination airport's traffic pattern and then land there.

The navigation methods we will use for this tutorial are 'dead reckoning' and 'pilotage'. In dead reckoning, we head in a certain direction and determine our position along our route by calculating time with airspeed. With pilotage, we look for landmarks on the ground for guidance. Although we could use radio nav aids in a visual flight, in this instance we will concentrate on our pilotage navigation method instead.

You will notice during your flight that navigating visually is not easy, because your view of ground-based landmarks is blocked by your instrument panel and your aeroplane's nose. Using time/distance/airspeed is not so easy either, because it requires close attention to your clock and writing down the times when you pass important points en-route.

With origins as an American World War II airbase, Stansted became London's third commercial airport in 1979. Handling 5 million domestic and international passengers every year, it is London's fastest growing airport. Among more than 20 airlines using the airport are British Airways, Aer Lingus and Virgin Express. In June 1983, 250,000 people showed up to see the space shuttle Enterprise and its 747 carrier arrive at Stansted.

Stansted is about 25 miles north/northeast of London City. In our single-engine, fixed-gear aircraft, this flight should take

approximately 15 to 20 minutes including take off and landing time. Your exact duration will vary with the aircraft you use, because some are able to fly a bit faster than others.

Prepare your flight

Our VFR flight plan reflects our en-route path between these airports, landmarks we will use for guidance, and our fuel estimate. Write a flight plan such as this for other cross-country flights you do.

A fixed-gear aircraft has been selected to simplify our flight. If you don't have a fixed-gear aircraft, leave your gear extended throughout the flight. Later, we'll use a retractable gear aircraft.

We will refer to our prior VFR tutorial in Issue 1 to minimise duplication in this tutorial. If you don't have that tutorial, contact PC Pilot and the team will arrange a back issue for you.

Pilot: PC Pilot		Flight-Sim Flight Plan		Date:	
Flight Rules VFR <small>(this one)</small>	Aircraft Type Single engine <i>Fixed gear</i>	True Airspeed 120 kts	Departure Time	Cruising Altitude 2000 MSL	Arrival Time
Flight Route					
Landmarks		Nav aids & Frequencies		Headings	Durations
London City EGLC				029	(estimated) (estimated)
Stansted Airport				9 nautical miles	7 minutes
North Weald Airport				5 nm	5 min
Stansted Airport EGSS				10 nm	5 min
Stansted traffic pattern for runway 25				3 nm	2 min
				27 nm	17 min
Origin Airport		Destination Airport		Alternate Airport <small>(IFR only)</small>	
Name: London City EGLC		Name: Stansted EGSS		Name:	
Elevation: 17		Elevation: 348		Elevation:	
ATIS: 127.95		ATIS: 127.17		ATIS:	
Tower or Departure: 118.07		Tower or Arrival: 123.8		Tower or Arrival:	
				Estimated Duration	
				20 min	
				Fuel Needs	
				30 gallons	
COPYRIGHT © 1997, 1998, 1999, Bill Stack and Training Associates, 316 Wesley Road, Knoxville, Tennessee, 37909-2663, USA, (423)-584-7340. All rights reserved. No part of this form may be reproduced by any means without the publisher's written permission. Produced in the USA. DISCLAIMER: This flight plan form is only for flight-sim games. It is not for real aviation. The publisher accepts no liability for any misuse of this form.					



All the charts used in our tutorials have been specially supplied and reproduced with kind permission of Jeppesen GmbH.

We would like to thank Heinrich Schaible, Andrea Stumpf and Ilka Arns of Jeppesen Europe for their efforts and help with this issue of PC Pilot Magazine. Please note: these charts are NOT to be used for real navigational purposes. They are for information ONLY. All charts are ©1999 Jeppesen GmbH

Check Your Fuel

VFR regulations require us to carry enough fuel to reach our destination, plus an additional 30 minutes flying. This means we will need enough fuel for at least one hour of flight. Our estimate of 20 gallons is shown on our flight plan. Be sure to have at least this much fuel when you take off.

Check the Weather

Prior to take off, check your weather briefing (through the simulation's weather menu) for local barometric readings and adjust your altimeter accordingly. Failing to adjust the altimeter for local barometric pressure invites trouble, because you could actually fly lower or higher than you think. A half-inch or 17-millibar difference, which is fairly common, can make you think you are 500 feet above or below where you actually are. Flying lower than you think risks striking buildings, towers and other obstructions en-route. Flying higher than you think risks impeding other air traffic.



London area chart showing approximate VFR flight path from London City Airport to Stansted Airport

- A London City Airport
- B Stapleford Airfield
- C North Weald Airfield
- D Stansted Airport

Begin your flight

Take off according to the guidance in our first tutorial in Issue 1.



20-degree right turn. Note the Attitude indicator

When you reach 1,000 ft MSL (above mean sea level), which at London City airport is nearly the same as AGL (above ground level), turn right at a 20-degree bank to a heading of 029. This heading will take us just south of Stansted airport where we can join the downwind leg of the basic traffic pattern.

Magnetic variation in London is 004W. This means that when the magnetic compass reads 000, the true heading is 356. This variation is not a major problem for us, but it should be considered when determining the heading on a dead reckoning flight. When taken from the chart, our heading to Stansted shows 025, but 029 magnetic is precise because of the local variation. Actually, either heading will get us to Stansted because of the short distance and slight variation.

Continue climbing gradually to an en route altitude of 2,000 ft MSL. It will provide plenty of clearance above buildings and towers in our flight area.

Keep busy during your flight

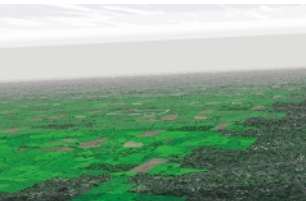
You might be tempted to do something else during the 15-minute en-route portion of your flight. That's all right in flight simulation, but in real world pilots must pay attention to their flights. Always remember that real world flying is mostly boredom with excitement at the beginning and end. Nonetheless, there are plenty of things to do en-route.

Note the time when you begin your en-route portion of the flight. It will take about 12 minutes and then the airport should be visible just below the horizon.

During your flight, hold your altitude and heading with trim rather than autopilot. Once your altitude is stable, occasional adjustments might be needed.

Monitor your tachometer. Keep it within the normal operating range throughout the en-route portion of your flight. At 2200 RPM, your airspeed should be about 110 knots to 120 knots, depending on the aircraft you are flying.

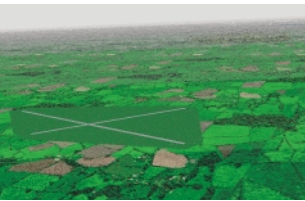
Look for and note landmarks along the way



Passing Stapleford Airfield en-route to Stansted

Landmarks are an important means of navigating visually. Next time you fly this route, you can use them as guides.

You will pass two airfields during your flight to Stansted. The first is Stapleford, and the second is North Weald. Stansted should be the third airport you see. If you do not see these then you are not on the correct course. You should see Stapleford a few minutes after heading 029, and you should see North Weald a few minutes after that. In fact, you should see North Weald as you pass Stapleford. Make a note of the elapsed time when you pass Stapleford and North Weald, such as five minutes from London City or eight minutes from London City, and so forth.



Passing North Weald Airfield en-route to Stansted.

Also note the River Roding close to the M11 motorway along your track. In the Flight Simulator 98 scenery the river ends about half way to Stansted, and the motorway passes Stansted to the west.

About 12 minutes into your flight you should see Stansted airport directly ahead of you. If it isn't directly ahead then adjust your heading accordingly. In another minute or so, it will be clearly recognisable as an airport.

Join Stansted's traffic pattern

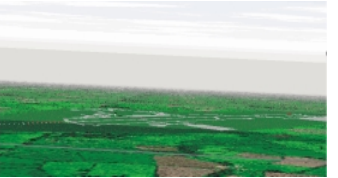
When you clearly see Stansted's features, such as the runway, taxiways and ramps, begin preparation for your approach. Descend to pattern altitude first and then join the pattern.



Descending toward Stansted to enter the downwind leg

Descend to a pattern altitude of 1,000 ft AGL. At this airport, that altitude will be 1,348 ft MSL (1,350 ft is close enough), because this airport's elevation above sea level is 348 feet. Descend gradually by reducing your power slightly. Maintain a 100-knot airspeed. Do not descend by pushing your aircraft's nose downward. That will

increase your airspeed. Check your vertical speed indicator, and do not descend faster than 500 feet per minute, because it could hurt your passengers' ears (due to a sudden change in pressure). If you are descending too fast, increase power slightly to decrease your descent rate. If you are descending too slowly, decrease your power slightly to increase your descent rate. Use your elevator trim to hold your pitch.



Joining the downwind leg of Stansted's traffic pattern

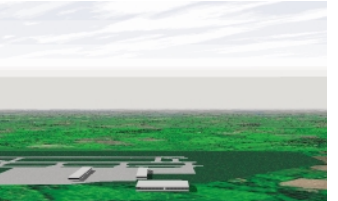
Join the traffic pattern for runway 23 by turning right for a heading of 050. This heading will place you on the downwind leg of the traffic pattern (opposite of 230). You will then see the runway ahead and to the left. Magnetic variation doesn't matter in this case, because runways are numbered for magnetic instead of true headings. Knowing when to enter a traffic pattern requires visual guidance and practice. The screen shot shows approximately how the runway should appear when you are close enough to enter the pattern.

Contact ATC on 125.55, as shown on the chart, and inform them of your intention to land at Stansted. We're foregoing the standard terminal approach procedures for this visual flight, and we will imagine that we have requested and received ATC's approval for our procedure.

Check your weather briefing (again, through the weather menu) for local barometric readings and adjust your altimeter accordingly. Failure to adjust the altimeter for local barometric pressure invites trouble, because you could approach too low or too high for a safe landing. Remember that even a small setting error can make significant altitude error.

Pause any time you need to. You will not have an instructor sitting there with you to help

Once you are at your 1,350 ft MSL pattern altitude, use your elevator trim to hold that altitude through the downwind leg. Apply enough power to maintain your 100-knot airspeed at this altitude.



Passing runway 23's threshold. Turn onto the base leg in 30 seconds



Turning from downwind to base leg

You will observe the runway passing your left view window as you fly past. As you pass the threshold of runway 23 (eastern end), note the time. In about 30 seconds, you will begin your turn onto the base leg. Timing is for your knowledge, not for determining when to turn onto the base leg.

Follow the guidance in our first tutorial in Issue 1 for completing your traffic pattern and landing.

The lack of significant ground features for reference near this airport is a drawback to flight simulation that we can use to our advantage - it prevents distractions while we should be paying attention to flying our aircraft.



Final approach

Land as explained in our first tutorial. If your landing isn't good enough, go around and try again. Otherwise, exit the runway and park your aircraft on the ramp.

Congratulations!

You've just completed a visual cross-country flight from take-off to landing, using the world's oldest navigation methods. From this short tutorial, you can see that visual flying is challenging in its own right.

Repeat this entire tutorial for practice as many times as you like. One luxury of flight simulation is



Touchdown! At London Stansted's runway 23

that we don't have to fly back to our origination airport. In a future tutorial, we'll fly from Stansted to another airport in the London area using pilotage.

Bill Stack



Bill Stack

PC Pilot's tutorials are officially approved by TopSkills (formerly Training Associates)

Bill Stack is an expert flight simmer, the author of numerous training manuals for flight simulation computer programs and the owner of Training Associates in the USA. Training Associates publishes and distributes reference and self-learning books about flight simulation and other subjects.

The books that cover various flight sim subjects are:
Flight-Sim Pilot's Information Manual 1999
Instrument Flying for Flight-Simulation Pilots
Flight Sim Navigation
Flight Sim Maneuvers
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IFR (Instrument Flight Rules) Tutorial

Part 2 Flying from London City (EGLC) to Stansted (EGSS)

For this IFR tutorial, we will fly from London City airport in central London to Stansted Airport a short distance north east of London. The objective will be to learn SID (standard instrument departure) procedures, en-route procedures, STAR (standard terminal arrival) procedures and an IAP (instrument approach procedure).

Stansted is about 25 miles north/northeast of London City Airport. In our single-engine fixed-gear aircraft, this IFR flight should take about 30 minutes including take off and landing time. Your exact duration will vary with the aircraft you use because some are able to fly a bit faster than others. It will be longer than a VFR flight, because the instrument procedures will take us about 15 miles west and five miles north of the airport.

Prepare your flight

We will use a fixed-gear aircraft to simplify our flight. If you don't have a fixed-gear aircraft, leave your gear extended throughout the flight. After you feel comfortable with the procedures, you can use a retractable gear aircraft for this flight.

In your simulation's weather menu set the cloud ceiling at 1,000 ft MSL and tops at 5,000 ft MSL. This setting will keep you within the clouds for most of your flight. Set winds at zero knots. You will have enough tasks to keep you busy without fighting winds. After you feel confident with these procedures, set a mild five-knot wind and see how different your flight will be.

The radio navigation method we will use for this tutorial is VOR

(very high frequency omnidirectional range beacon). We will head toward certain VORs and then join the standard approach procedure for Stansted's runway 23.

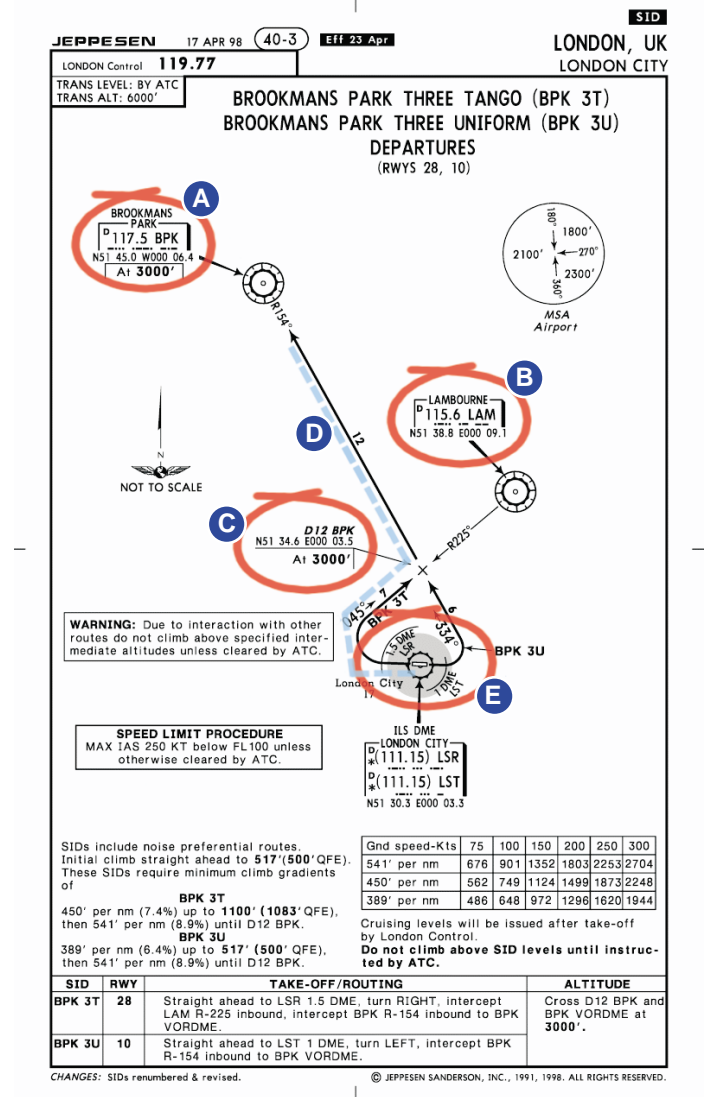
Our IFR flight plan shows our en-route path between these airports, the instrument procedures and radio navigation aids we will use and our alternate airport required by IFR regulations. This is a short training flight and in the interest of space and simplicity, we will choose London City as our alternate. If weather prevents us from landing at Stansted we will return to London City.

Set your Nav1 radio to 115.6. That's the frequency for Lambourne VOR (LAM), which you will use first. Set your ADF (automatic direction finder) for the NDB (non-directional beacon) at Stansted (SSD). On the official Jeppesen chart, that frequency is 429. In Microsoft Flight Simulator 98, the frequency is 359. In ProPilot 99, that NDB is not included. Microsoft simmers can use this NDB for helping with runway alignment for final approach and for reference during the flight to Stansted.

Review Your Charts

We will follow the published instrument procedures for London City and Stansted airports as closely as we can, given the limits of flight simulation. The procedures for using both airports call for precise ATC guidance. In lieu of it, we will use the headings, fixes and altitudes shown on the procedures as closely as real pilots would do with real ATC guidance.

Pilot: <i>PC Pilot</i>		Flight-Sim Flight Plan		Date:	
Flight Rules <i>Circle type</i> VFR	Aircraft Type <i>Single engine</i> IFR <i>Fixed gear</i>	True Airspeed <i>120 kts</i>	Departure Time	Cruising Altitude <i>3000 MSL</i>	Arrival Time
Flight Route					
Landmarks	Nav aids & Frequencies		Headings	Distances	Durations
	<i>Lambourne, LAM, 115.6</i>		<i>045</i>		
	<i>D12 BPK (fix)</i>		<i>045</i>	<i>7 nautical miles</i>	<i>3.5 minutes</i>
	<i>Brookman's Park, BPK, 117.5</i>		<i>334</i>	<i>12 nm</i>	<i>6 min</i>
	<i>Barkway, BKY, 116.25</i>		<i>027</i>	<i>16 nm</i>	<i>8 min</i>
	<i>D10.0 BKY (fix)</i>		<i>070</i>	<i>10 nm</i>	<i>5 min</i>
	<i>D11.0 BKY (fix)</i>		<i>070</i>	<i>1 nm</i>	<i>0.5 min</i>
	<i>Stansted, 125.83, 15X, 110.5</i>		<i>226</i>	<i>8.2 nm</i>	<i>4 min</i>
	<i>Stansted, SSD, 429</i>		<i>226</i>	<i>6 nm</i>	<i>3 min</i>
				<i>60.2 nm</i>	<i>30 min</i>
Origin Airport		Destination Airport		Alternate Airport (IFR only)	
Name: <i>London City EGLC</i>		Name: <i>Stansted EGSS</i>		Name: <i>London City EGLC</i>	
Elevation: <i>17</i>		Elevation: <i>348</i>		Elevation: <i>17</i>	
ATIS: <i>127.95</i>		ATIS: <i>127.17</i>		ATIS: <i>127.95</i>	
Tower or Departure: <i>118.07</i>		Tower or Arrival: <i>123.8</i>		Tower or Arrival: <i>118.07</i>	
				Estimated Duration <i>30 min</i>	
				Fuel Needs <i>30 gallons</i>	
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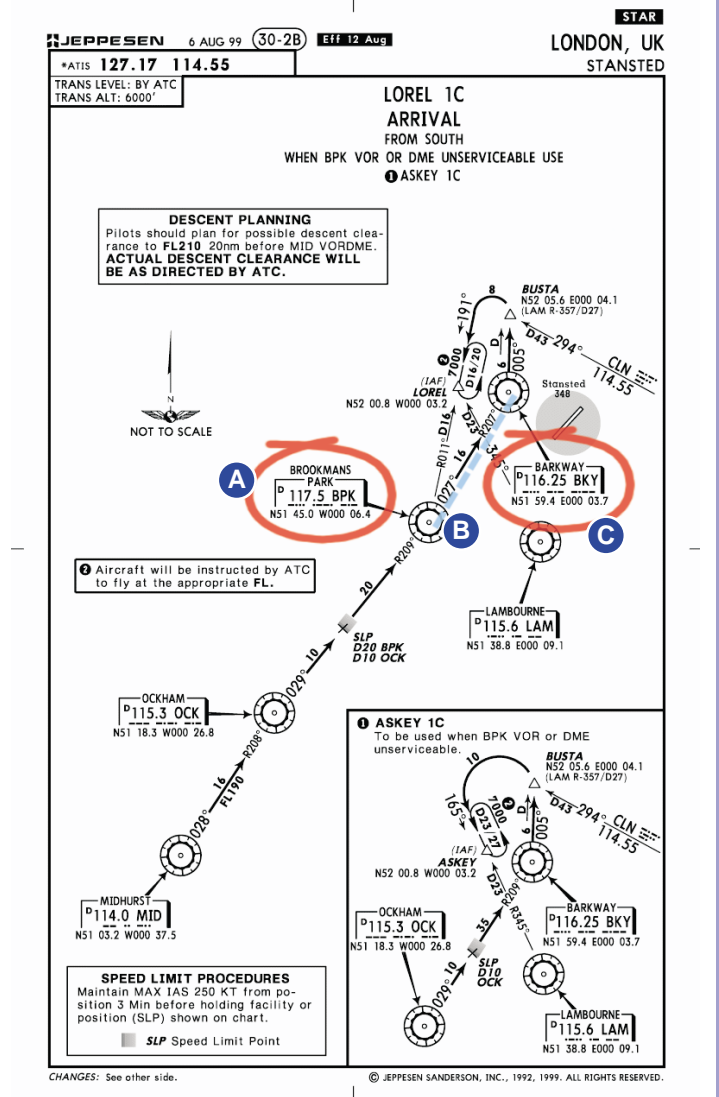


- A Brookman's Park VOR
- B Lambourne VOR
- C D12 BPK Fix
- D Approximate flight path
- E London City Airport

NOTE: In this issue of PC Pilot, the charts are also provided without guides as an A4 card insert. They are part of a growing collection you will receive with each issue of PC Pilot.

The first chart we will use is the SID based on Brookman's Park VOR. Accordingly, it is called Brookman's Park Three Tango (3T) and Brookman's Park Three Uniform (3U). We will use the 3T departure, because we will take off from London City Airport toward the west on runway 28. It will take us to Brookman's Park VOR about 18 nautical miles north/northeast of London City Airport.

The second chart will be a STAR for Stansted. It is called LOREL 1C, because it uses a fix named LOREL, west of the airport. It will take us from the Brookman's Park VOR to the Barkway VOR, where we will switch to an IAP chart for Stansted. We will bypass the LOREL fix and its associated holding pattern on this STAR and go directly to the Barkway VOR, near Stansted.

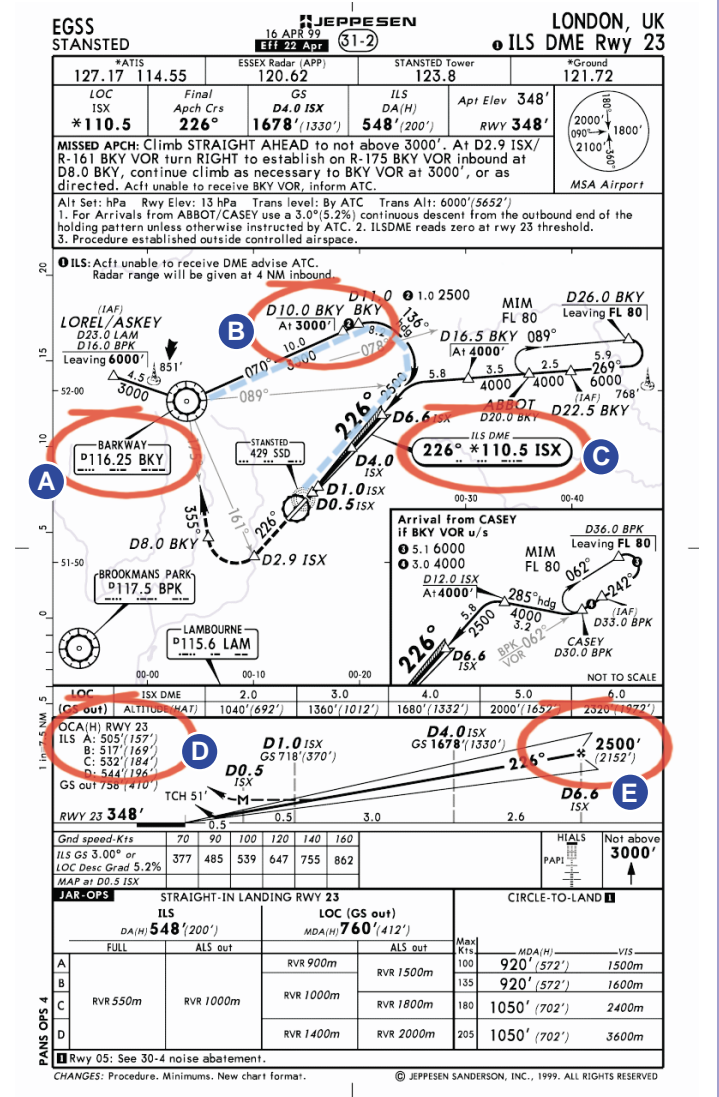


- A Brookmans Park VOR
- B Flight Path
- C Barkway VOR

flight paths on the first three charts to this chart, you can clearly see where we're going and how we will get there.

Based on the charts, we will select a 3,000 ft MSL cruising altitude for our flight. The SIDs for London City Airport state that "cruising levels will be issued after take off by London Control". It also instructs pilots to "not climb above SID levels unless instructed by ATC". STARs for Stansted state that "descent clearance will be as directed by ATC". The SID and STAR charts show cruising altitudes of 3,000 ft MSL, and the IAP for Stansted shows entry into the procedures at 3,000 ft MSL. In lieu of ATC guidance, we will use the 3,000 MSL flight levels shown on these charts. This altitude will provide plenty of clearance above buildings and towers in our flight area and keep us clear of other routes in this busy airspace.

We will refer to our IFR tutorial in Issue 1 to minimise duplication in this tutorial. If you don't have that tutorial, contact PC Pilot and the



- A Barkway (BKY) VOR frequency
- B D10.0 and D11.0 fixes
- C Runway 23 ILS/DME frequency
- D Decision height
- E ILS intercept altitude

We're estimating that 30 gallons of fuel will be ample for this tutorial, as shown on our flight plan. Be sure you have at least this amount of fuel in your tanks when you take off.

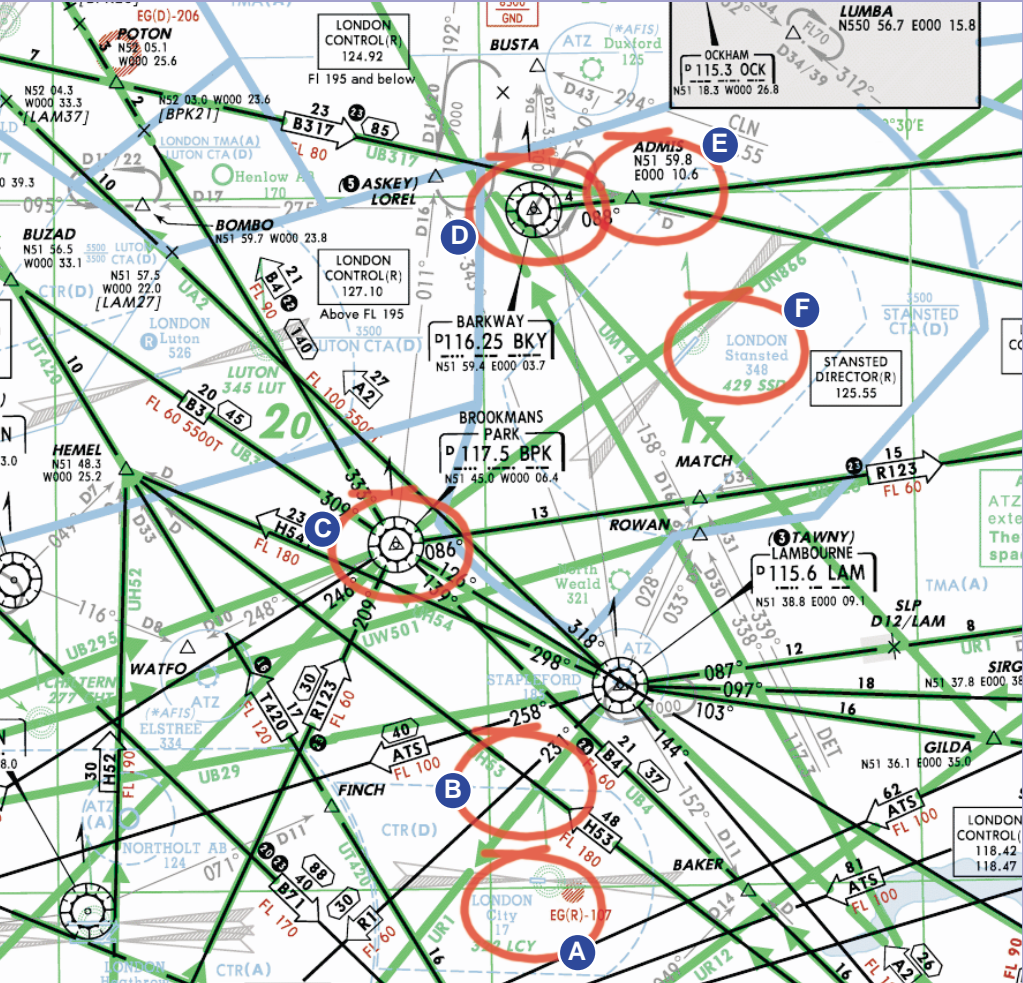
Begin your flight

Take off according to the guidance in our first tutorial. Climb out at the best angle-of-climb airspeed. It's about 80 knots to 100 knots in typical single-engine general-aviation aircraft.

When you reach 1,100 ft MSL, turn right at a standard rate and head 045 for the Lambourne VOR. Remember from our earlier tutorial that a standard-rate turn is one that covers 180 degrees of arc in one minute and three degrees in one second. Standard rate turns are typical for instrument flight. You know when you are turning at a standard rate when the airplane symbol in your turn coordinator is aligned with the L or R (left or right). Set your OBI for 045, and wait for the needle to sweep into place as you exit this turn. If you

climbed at the best rate of about 80 knots, began turning when you reached 1,100 MSL, turned at a standard rate, and straightened out to 045, you should be heading straight for LAM along its 045/225 radial. If not, maintain your 045 heading and fly toward fix D12 BPK shown on the chart.

Switch your VOR receiver to Brookman's Park (BPK). Its frequency is 117.5. Set your OBI to 334 and wait for the needle to sweep to the centre. When you intercept BPK's 154/334 radial and are 12 miles from it according to your DME, you are at the fix labelled D12 BPK. This designation means the fix is 12 miles from BPK VOR. At this point, turn left at a standard rate and head 334 toward BPK along its 154/334 radial. TIP: When the



London area chart showing approximate IFR flight path

needle is not quite at the centre, begin your left turn. You should be aligned with the 334/154 radial when you exit this turn.

Continue climbing steadily to our 3,000 ft MSL flight altitude, then level off and maintain that altitude until you reach the Stansted approach procedure.

Keep busy during your flight

You might be tempted to do something else during the 20-minute en-route portion of your flight. That's all right in flight simulation, but in the real world pilots must pay attention to their flights. Always remember that real world flying is mostly boredom with excitement at the beginning and end. It's more so during an instrument flight, because there is no scenery to look at or follow. Nonetheless, there are plenty of things to do.

Note the time when you begin your en-route portion of our flight. It will take about 20 minutes. You will reach BPK VOR in a about six or seven minutes, and you will reach the next VOR, Barkway (BKY), about 15 minutes after leaving London City.

Hold your altitude and heading steady with trim rather than

autopilot. Once your altitude is stable, occasional adjustments might be needed.

Monitor your OBI and stay on course for BPK. Remember that many other airplanes are flying in this busy airspace and we have no ATC radar guidance to keep us clear of other aircraft and vice versa. Occasional minor adjustments might be needed to stay on course.

Keep your tachometer within the normal operating range throughout the en-route portion of your flight. At 2300 RPM, your airspeed should be about 110 knots to 120 knots, depending on the aircraft you are flying. We're using this airspeed so that things don't happen too fast for you to react, and because some fixed-gear aircraft won't go faster.

Track your progress along the way

Follow your progress along the VOR radials by using its DME. As examples: When the DME to BPK (as you are heading toward it) reads 8 miles, you are about halfway between London City and BKY. When the DME from BPK (after you have passed it) reads 2

miles, you will be passing east of Panshanger Airport.

When you reach BPK, turn right and head 027 toward your next VOR. You will know when you have reached BPK when your DME shows you within a few tenths of a mile to it and when your OBI needle sweeps off the dial. The next VOR is Barkway (BKY), and its frequency is 116.25. Tune it on your Nav1 radio, set the OBI to 027, and follow the 027/207 radial to it. This portion of your flight will take eight or nine minutes.

As you pass by Panshanger Airport, be aware that other aircraft are probably using that airspace and that the Panshanger tower will be watching your flight carefully on radar. It will be to your left, even though you cannot see it.

When you reach BKY, head 070 toward the instrument approach fixes. You will know when you have reached BPK when your DME shows you within a few tenths of a mile to it and when your OBI needle sweeps off the dial. Reset your OBI to 070 and follow this course for the next 11 miles, which will take about five or six minutes.

- A London City Airport
- B Departure fix
- C Brookman's Park VOR
- D Barkway VOR
- E Instrument approach fixes
- F Stansted Airport

Join Stansted's Instrument Approach for runway 23

We will follow the instrument approach for runway 23 as closely as we can within our flight simulation limits. As one example, the designated initial approach fix (IAF) is west of Barkway VOR, but we will enter the procedure at Barkway. We will imagine that we have requested and received ATC approval for our modified procedure.

Enter the Approach Procedure

Follow the next steps precisely. They will keep you busy until you are on the ground.

1. Check your weather briefing (through the weather menu) for local barometric readings and adjust your altimeter accordingly. Remember our cautionary note earlier concerning this.
2. When you are 10 miles from BKY, according to your DME, begin a 500 foot-per-minute descent to 2,500 ft.
3. Contact Stansted approach on 120.62 as shown on the chart, and inform them of your intention to land at Stansted.
4. When you are 11 miles from BKY according to your DME, turn right and head 136. You should be at 2,500 ft MSL at this fix. If not, begin your turn anyway and continue descending to 2,500 ft MSL. Beginning your turn at the D11.0 fix is necessary, while being at 2,500 ft at this fix is not.

This area of the instrument approach procedure is unclear and subject to interpretation. Real world pilots using this procedure would benefit from ATC vectoring, but we are left to determine the exact procedure ourselves. After trying several ways, we decided that this method works best:

5. Set your OBI dial for BKY's radial 078. When you reach this radial, turn right at a standard rate to a heading of 226.
6. During your turn, tune your Nav1 radio to the ILS for Stansted runway 23. Its frequency is 110.5. You will not need BKY any longer.
7. When your heading is about 220, begin exiting your turn and head 226. You should be close to intercepting the localiser when you straighten out.

Intercept the localiser

Upon exiting this turn, you should be headed 226 and be aligned with the localiser. The vertical needle centred in the OBI will show this alignment. Adjust your heading as necessary if you are not aligned. Move toward the right if the needle is to the right and vice versa. The farther the needle is from the centre the more you will need to move, obviously, but do all these manoeuvres gently. You are about seven miles from the runway, so you have plenty of room and time for aligning the localiser.

Intercept the glide slope

Continue along the localiser and at your 2,500 ft MSL altitude until you intercept the glide slope. The horizontal needle being centred in the OBI will show this interception. According to the profile view on the chart, this interception should take place when we are 6.6 miles from the runway, which is plenty of distance for an accurate and safe approach.

Begin your descent

Once you have intercepted the glide slope, reduce your power to begin your descent and then follow the glide slope and localiser to the next fix. Reduce or increase power as necessary to maintain your descent along the glide slope and nudge left or right to maintain your path along the localiser.

Be sure your landing lights are turned on. Their brightness can help other pilots see you through the precipitation, fog and/or low clouds.

Turn on your carburettor heat. Ice can build up in the carburettor during low power settings and when humidity is high. Instrument meteorological conditions are usually sufficiently humid for carburettor icing. Many small aircraft manufacturers recommend carburettor heat during landing approaches, anyway.

The chart shows that when you are 4 miles from the runway your altitude should be 1,67ft MSL. If you are on the glide slope, shown by the horizontal needle being

centred, this should not be a problem. If you are not at this altitude at this distance from the runway, you need to correct your altitude immediately.

Land or try again

Your next fix is the decision point. Here, you will decide whether to continue with your landing or abort it and execute a missed approach. It is called 'decision height' because height is used as the guide. The list in the left end of the profile view on the chart shows our decision height at an altitude of 505 ft MSL along the glide slope (our light aircraft is class A, and the glide slope is working). When you reach this altitude, you should see the runway ahead of you. If so, you can continue with your landing. If not, you must abort your landing and execute a missed approach. Notice on the chart that 505 ft MSL is also 157 ft AGL. This means you will be very near the ground when your decision is required, and the runway should be right in front of you at this point. With our 1,000 ft MSL ceiling, you should spot the runway well before reaching this

decision point, so make whatever adjustments are necessary to align it for landing.

Execute a Missed Approach

If you need to abort your landing, execute a missed approach immediately as follows: throttle up to full power, climb to 3,000 ft and notify ATC as soon as practical. When you are at the 161 radial of BKY, turn right and head 355 to BKY. Repeat this approach procedure from that point. Normally ATC would hold you at a fix and instruct you what to do next, but for the sake of simplicity and the consideration of space, we will imagine that ATC will clear you for another approach right away.

Or land

If you do not need to execute a missed approach, proceed with your landing as usual. Exit the runway or take off again and repeat this tutorial, whichever you choose.

Bill Stack



Competition

All you have to do to be in with a chance is have a look through the tutorials section in this issue and answer the following questions:

- 1) What is the frequency of the Brookman's Park (BPK) VOR Station?
- 2) According to the IAP for London Stansted, what should be your altitude when you are 4 miles from the runway?
- 3) How many people were present to see the space shuttle at Stansted In June 1983?

Please send in your answers on a postcard or on the back of an envelope to:
Jeppesen Competition,
PC Pilot Magazine Ltd,
PO Box 3002, Brighton, BN2 2BZ, United Kingdom

Please make sure you clearly state your full address, e-mail address (if you have one) and telephone number.

We will draw three separate winners from the correct answers received. Good luck.

Competition closes 15th January 2000. Entries received after that date will not be included.



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Author with the proposed MD902 Explorer due for delivery in 2000



The simulated and real cockpit of the Twin Squirrel of Greater Manchester Police

We are all familiar with the sights and sounds of police helicopters passing above us, going about their daily business. However, like most things we take for granted, the workings of a police air support unit remain a mystery. Tony Madge, an Air Observer with the West Midlands Police Air Support Unit, provides us with a detailed insight into one of the most exciting areas of law enforcement. Based at Birmingham International Airport, the Air Support Unit was formed in conjunction with other forces of the region, when in 1987 a fixed wing Britten-Norman Islander and a Bolkow Bo 105 helicopter were acquired. It is here that his story begins:

I joined the West Midlands Police in the early part of 1987 and after some months of induction it was decided that I was trained enough to be let loose on an independent foot patrol. This is a vivid memory, not because I was out in full uniform for everyone to see, but on that day the Police Air Unit had been scrambled to search for a stolen car. As I walked along my beat I heard in the distance the sound of a Bolkow helicopter for the first time.

I will always remember the thudding noise that came from the main rotors. They seemed to beat the air into submission as the machine crossed the skyline and it sounded incredibly loud. The helicopter came closer and was so low it seemed that if I were to reach up I would be able to touch it. As quick as the Bolkow had appeared over the suburban horizon it was gone, but the sound lingered on even after it was hidden from view behind the tall buildings. My decision on what to do in the Police had been made by that brief encounter. For the next few years I waited for a chance to join up with the Air Support Unit.

In 1989 the West Midlands Police decided to form an independent Air Support Unit of their own and purchased an Areospace AS355 F2 Twin Squirrel helicopter. This unit initially operated from some portacabins at Birmingham International Airport, but in 1996 it was moved to custom designed offices

incorporating an operations room, training facilities and other useful functions. In the same year, after a long wait, I finally joined the Air Support Unit. Following initial training on a designated CAA (Civil Aviation Authority) Air Observer course, I began service in September. While other officers cruised the streets in normal police cars, my patrols were done from the sky in the Twin Squirrel G-WMPA.

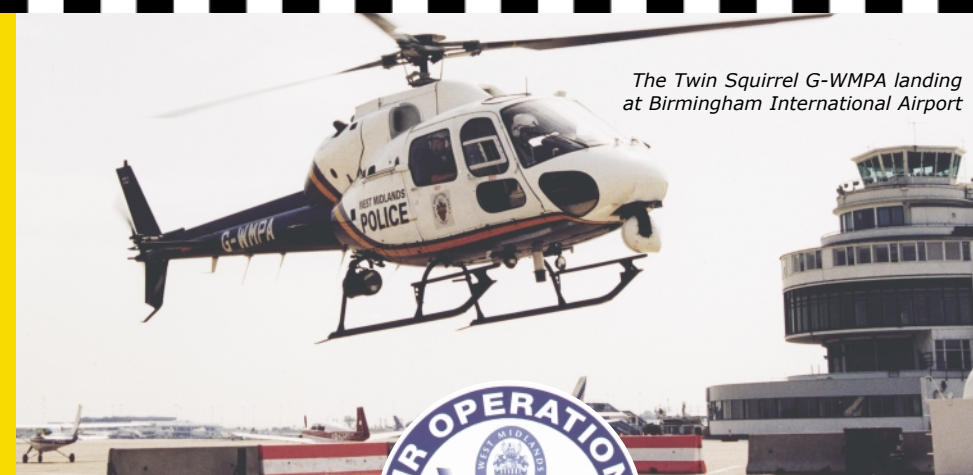
The Air Support Unit is on call 24 hours a day and is available to attend any incident. It is primarily designed to give help and support to officers on the ground. Some typical examples of this are: vehicle pursuits, preventing offenders going to ground, searching for missing persons and controlling large demonstrations.



Three crew members of the West Midlands Air Support Unit - Tony Madge far right



Birmingham Airport taken from 8000 ft



The Twin Squirrel G-WMPA landing at Birmingham International Airport



The type of work carried out by the Air Operations Unit often means that we appear to be flying much lower than other air traffic. However, all our aircraft operations are under the strict guidance of the PAOC (Police Air Operators Certificate) and regular checks are made by the CAA to ensure that we achieve the required

standards. Any failure could result in the certificate being revoked. The granting of a PAOC gives UK Air Support units special easements and allows us to carry out our duties safely and efficiently. All the formal procedures and guidelines that we work to are contained in The Police Air Operations Manual

The Air Support Unit currently has five pilots and they are all ex-military. The requirements for any new pilot joining the team are a minimum of 1500 hours flying helicopters, 500 hours on twins and at least 50 hours night flying. The crew, including maintenance staff, are supplied by the Police Aviation

Services based in Gloucester. The observers are all serving police officers and at the moment there are 11 of us who work full time. The shift patterns are set up so that there is a natural crew rotation.

In this way everybody works a certain period of time with one observer and pilot before moving on to a new crew.

To give a better idea of what we actually do, here is what happened on a typical Saturday night during the summer:

21:45 It's our sixth night on duty and only one more to go before we can leave this nocturnal world and go back to a normal routine. So far it has been just busy enough to keep us all ticking over and thwart the sleepiness that hits the body in the quiet hours. I am working with Pete and an ex-Army pilot called Andy.

The previous crew brief us on the aircraft we will be using and include details of any repairs that were carried out during their shift. They also report if there are any pre-planned tasks that we will be called on to perform that night. Fortunately, G-WMPA is working fine and no operations have been arranged for our shift to carry out. Once the 'off-going' pilot has also briefed Andy we can go about the job of sorting out our individual tasks.



Cruising at around 120kts to the crime scene

Heli Squad!

Air Support Unit, West Midlands Police

Pete chooses the observer's seat at the front, which is located on the left side of the helicopter. Andy doesn't have much choice and always gets the right hand seat! Pete's duties are to use the FLIR (Forward Looking Infra Red) thermal imaging camera and record the incidents we visit onto video tape for evidence. I am in the back, sitting directly behind Andy. From here I am responsible for monitoring the radios, operating the searchlight and helping with the navigation.



Flight Sim 98 version of the MD902 Explorer

Andy goes out to the helicopter to check and sign for it. The pilot must complete a Helicopter Check 'A' at the start of every shift. This is quite a thorough look over and we are all happy for our chauffeur to spend as long as it takes. He wants to go home at the end of the shift like the rest of us!

I decide to do one of the most important jobs and get the tea ready for the crew briefing while Pete gets the weather report off the computer. Meanwhile, Andy returns and tells us that the Helicopter is serviceable with no snags and has 55% fuel. He has already worked out the c of g (centre of gravity for an aircraft) with our respective positions in the helicopter. He informs us that we have 16 hours flying time until the next standard 50 hour service. The weather for the night looks fine with broken cloud at 3,500 ft and good horizontal visibility.

With all the briefing items out of the way and the crew booked on duty by the control room, it is just a matter of waiting for the first call out. The helicopter sits out on the pad some 150 meters from our office on the western apron of the airport. This is already filling up with the usual night visitors, mainly BAe146 and Lockheed Electra freighters. We do not have long to wait and the radio linking us to the Force Communication Centre soon bursts into life. We are being requested to attend the north of Birmingham to pursue a stolen car heading towards Walsall. Due to the immediate nature of police call outs there is no need to file a flight plan or we would be extremely late in getting to the job in hand!

22:03 Pete and I run the short distance to the helicopter, dodging round the busy forklift trucks that are setting about their task of emptying a newly arrived BAe 146. Andy is already strapped in and beginning the start sequence that will light up the two Allison engines. As we get closer to G-WMPA the noise of the rotors increases and the two turbines unleash their power through the blades. Even with the protection of our flying helmets, the volume threatens to scramble our brains. We wait for Andy to flash the landing light and give us the thumbs to approach and board G-WMPA. We have to wait

Observer's seat located on the left and the pilot takes control on the right. Note the thermal imaging screen



From Jan 98 to Jan 99 the following stats are recorded.

- 2,811 tasks flown.
- 506 hours on crime searches
- 84 hours on missing person searches
- saving in terms of cost of man hours to do searches 3D £14,756,441 it will take the helicopter some 4 minutes to clear an open field at night where as it could take a line of 100 persons 3 to 4 hours for a line search.
- 103 stolen vehicles located and recovered value in excess of £2,000,000
- 12 missing persons located
- 239 arrests directly attributable to the helicopter plus an unrecorded amount of assisted arrests

As you can see the high cost of operating a helicopter seems to be justified when the figures are scrutinised.

The new Explorer will have similar but updated equipment to enhance the role of the aircraft.

The whole concept of air support is to provide an extra set of eyes from our vantage point, which can be used by the officers on the ground as an aid to their job in hand.

The area we cover is relatively small at 348 square miles but is heavily populated with some 2.63 million people. I was told when I first joined that at night, if it isn't lit we don't cover it! This generally holds true but occasionally we are tasked outside our force area to assist other forces in searches etc. Training in the use of OS maps and general navigation techniques are always ongoing.

because 'blade sail' can cause the main rotors to dip during start up and give everyone in the area an unnecessary haircut. Once aboard, I strap myself in using a standard lap belt and dispatcher's harness. This can be extended and gives me the opportunity, if I am mad enough, to have the rear door open and stand on the skid, like an airborne bungee jumper.

Pete has a four-point harness in the front, which he buckles up. As I plug in to the radio, the noise of four police radio channels and ATC (Air Traffic Control) begin to compete with each other for my grey matter. I quickly select the stations that we need to hear and subdue the less important ones. The pilot goes through his pre flight checks and Pete is busy getting the FLIR ready for use. I get busy sorting out the initial heading and distance for Andy. This is the first critical phase of flight where the whole team must work together and know their individual responsibilities.

Andy calls Birmingham Tower for clearance and requests a lift to the north of the city using the call sign "Police 41". The active runway tonight is Runway 33 and this means that any incoming aircraft approach Birmingham from the south over the M42 motorway. Outgoing aircraft climb out towards the city keeping east of the centre, which is only five miles from the airport.

ATC come back almost immediately with confirmation and inform us that we must keep west of the active runway. Fortunately, the airport is on the south-eastern edge of the city so we are rarely in conflict with the approaches to the active runway, unless the task in hand is actually on the approach. At a busy airport like Birmingham this can cause some delays in our arrival at an incident scene. However, the ATC staff are very helpful and they can usually accommodate us as much as the rules will allow.

Andy checks we are all secure and we confirm, giving a "clear left and right" call. He pulls on the collective - the main rotors begin to alter their pitch and bite into the air. The machine

starts to lift and once airborne the nose is gently lowered to achieve a forward speed of 45kts before we head towards the city. In a very short space of time we are at 1,000ft and we increase our speed to around 120kts.

As we fly over the city it is lit up with the orange glow of sodium lights and looks like the embers of a bonfire.

Pete has the FLIR cooled down to an effective temperature where it will show the different heat signatures on the video display. He also activates the video recorder and the microwave link that sends real-time pictures back to the control room. I make contact with the base giving our position and task number. Once all this is done we can concentrate on getting to the target as soon as possible. I turn my attention to the ongoing radio commentary from the

G-WMPA - The new patrol car. Note the FLIR (Infra-red camera) ball at the front



police vehicles that give the position of the stolen car so we can work out where it is heading and try to intercept.

The car is now approaching Junction 7 of the M6 motorway and we are only thirty seconds away. Looking out for the blue lights of the pursuing police cars, Andy suddenly spots them at the 2 o'clock position and turns G-WMPA hard to the right and it responds immediately. To a first timer this feels like a ride on a roller coaster. The tail rotor generates a strange and distinctive noise as it twists and bites into the already disturbed air. In a matter of seconds we are positioned over the top of the police cars and quickly guided on to the target vehicle. The FLIR soon highlights the glow from the hot tyres and the engine bay coming through the bodywork. To assist our pursuit we light up the 30 million-candle power Nitesun spotlight. The beam is directed in front of the target vehicle so that the driver can see the shaft of light before him.

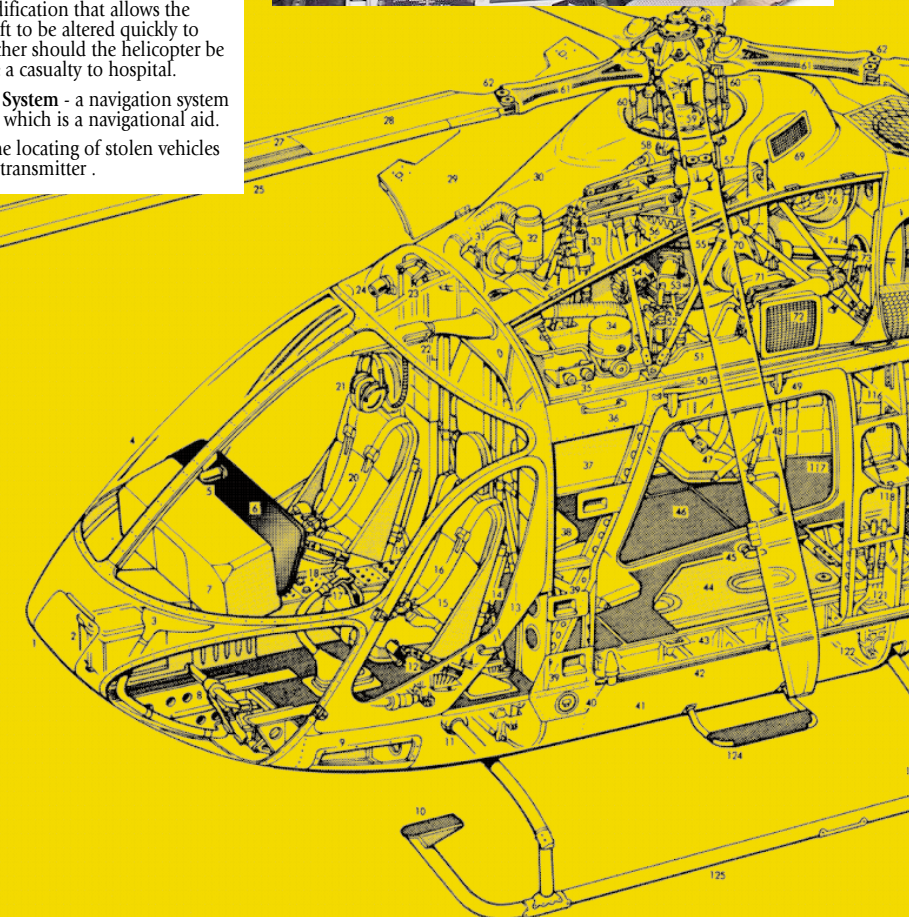
I begin to give the following police cars a commentary on the position of the target and describe his manner of driving. This gives the pursuing vehicles an opportunity to pull back or for the driver of the target vehicle to stop. This one decides to keep driving and then suddenly turns his lights off. It is a futile effort to throw the helicopter off as he is already captured on the FLIR and in the Nitesun beam. He's going nowhere but we have still to convince him of this! The road he is on continues for a couple of miles and is an ideal chance to get a patrol car

FACTS AND FIGURES

- Dual-role gyro stabilised camera platform - comprised of two camera systems. The first is a thermal image camera the second being a video camera providing broadcast quality images.
- Microwave downlink - the aircraft can provide to ground units and control rooms the same high quality pictures in real time that the crew view.
- Nitesun searchlight - a high powered light capable of illuminating search areas and vehicles involved in pursuits.
- Svhs video recorder - for the recording of high quality images for evidence.
- Gyro stabilised binoculars - for use in a search role and capable of reading a car registration number plate at 800'
- Stretcher fit - a modification that allows the interior of the aircraft to be altered quickly to accept a scoop stretcher should the helicopter be required to evacuate a casualty to hospital.
- Global Positioning System - a navigation system fitted to the aircraft, which is a navigational aid.
- Tracker - used for the locating of stolen vehicles fitted with a tracker transmitter.



The MD902 Cockpit showing off its new glass instrumentation



further down the road and lay a 'stinger'. This device is best described as a spiked mat that can be extended across the road in front of the approaching vehicle, puncturing the tyres so that control of the vehicle is not lost, but driving is made very difficult.

All of a sudden I see a stream of sparks coming from the exhaust of the target and the radio announces: "His engine has blown."

The pursuing police cars make short work of the distance to the car, which is now rapidly losing speed with every metre travelled. The driver decides that his legs are a better form of escape and promptly opens the door to jump ship. He quickly finds an alleyway and dives into it. Pete is already tracking him while I call the officers on the ground using a dedicated radio channel. They follow the driver, who has hidden himself in the back garden of a nearby house. Viewed through FLIR his body glows like a beacon allowing the officers to home in on him and he is soon in custody.

As there are no other impending tasks for us to deal with, we head back to base. With the airport in sight, Andy hands over from approach to the tower and they instruct us to route via Runway 06 to the western apron. As it is late, Andy requests an approach to 33. This takes us away from the houses that border our normal day approach and lessens the noise nuisance. After clearance is given, Andy makes his usual smooth landing (not that we ever tell him!) at a deserted airport. The night freighters have gone and the only traffic to move during the next few hours will be a charter flight to Majorca. The airport is ours for the majority of the shift. While Pete helps to refuel, I complete a task log and make the customary tea. Our evening meal has turned into breakfast and the city finally sleeps way past dawn...

G-WMPA helicopter will be replaced in January 2000 after ten years of sterling service and amassing some 9,000 flying hours. The choice for a new helicopter in the skies of the West Midlands will be an MD902 Explorer G-WMD.

It has many distinct advantages over the Twin Squirrel but the most visually noticeable is the lack of a tail rotor. This is replaced by a NOTAR that blasts out of the tail at some 200mph! This provides all the effectiveness of a conventional tail rotor without the disadvantages. This will mean the aircraft will not only be safer but more noticeably to the public, a lot quieter. The payload will also be far higher, giving the option of longer endurance and carrying improved role equipment.

When the new Explorer helicopter becomes operational it will have a 'glass cockpit' fitted. This demonstrates the greater emphasis that is currently placed on computer systems to assist pilots. The equipment monitors many factors such as engine temperature, oil pressure and fuel, leaving the pilot free to concentrate more closely on flying the aircraft rather than viewing the instruments. The MD902 Explorer checks itself constantly and the display will activate to inform the pilot if a fault occurs. The problem can then be effectively dealt with as a priority.

I have been interested in flight simulation for many years, originally getting hooked on Airbus for the Amiga. This was an excellent airliner sim at the time, but once flight simulation came out I retired the trusty Amiga and entered the world of PC simulation. Flight Simulator 98 (FS98) arrived and this meant a faster computer. Now my wife always shakes her head in amazement when I say: "this is definitely the last upgrade, honest."

When maintenance was being carried out on the helicopter, or when the weather was not at its best I would often use FS98 on the training computer at work. However, it wasn't long before the other pilots discovered the Bell helicopter and then I couldn't get near it! My personal preferences were the modern and classic airliners but soon the hard drive bristled with everyone's own personal favourites. Phantoms, biplanes and helicopters were all tried and tested by the pilots and observers alike. Some pilots didn't like the flight characteristics of the Bell and most simply crashed it! However, they kept coming back for more and I was soon inundated with requests to find other models on the Internet. Most were easy to get hold of, but the more obscure ones were harder to track down.

A visit to Keith's Virtual Helipad at www.members.aol.com/keith777/helipad.html soon tracked down the best of the helicopters. Two of the pilots previously worked on Chinooks, so we tried one of those. Then I

The following are some technical details regarding the AS 355F2 and the MD902 Explorer

AS 355F2

Engines: two Allison 250 C20F turbines
Max speed: 125kts
Max Take-off Weight: 5,600lb
Crew: 1 pilot 2 observers 1 passenger
Endurance: 2 hours max

MD902 EXPLORER

Engines: two Pratt and Whitney PW206E turbines
Max speed: 140/150kts
Max Take-off Weight: 6,900lbs
Crew: 1 pilot 2 observers and 4 passengers
Endurance: 3.4 hours max

All the above figures are dependant on fuel load, air temp. and pressure.

stumbled on a file called G-WMPA AS355F2 of the West Midlands Police that I quickly downloaded and installed. Unfortunately it turned out to be the Twin Squirrel of Greater Manchester Police. An excellent visual model and paint job even if it was not ours. The cockpit was interesting to compare to the one in G-WMPA, and as you can see there are definite similarities. It was not long before the pilots and observers alike had fun flying across the city of Birmingham in this particular aircraft on FS98! This was a bit of a busman's holiday and fortunately they fly the real one a lot better!

Viewed through FLIR his body glows like a beacon ...

It was then I decided to have a go at painting aircraft, having bought Aircraft Factory 99 and stupidly thinking that it built itself. I soon realised that although I was not the 'sharpest pencil in the box' this product needed time to get it to produce decent results, but after a lot of playing about I finally completed my first work. This was a paint job on a Bae146 in the colours of Jersey European, a large operator of its class, but so far neglected in FS98 role.

After posting it on www.flightsim.com I was soon hooked on trying various methods to improve my technique of flight modelling.

During another visit to Keith's Virtual Helipad I discovered an MD902 Explorer. Once it was downloaded I contacted the designer and with his permission began painting it in the West Midlands Police colours that G-WMID will display when it comes into service next year. As you can see it is devoid of the FLIR ball at this time but hopefully it is a fair representation of what G-WMID will look like.



Flight Simulator 98 version of the MD902 Explorer



At the moment we are looking for a more realistic simulator with instrument practice and procedural training programmes for the pilots to use. X-Plane has been investigated along with various other commercial products, but no decision has been made yet. For pure pleasure we will continue to beat up the skies in FS98 when the weather stops doing it for real. The MD902 G-WMID is not due in service until mid January but as you can see the FS98 version is flying now. Still, my version did not cost £2.5 million, just a few hours on Paint Shop Pro (although I think that shows!).

I am fortunate in that my job involves spending a lot of time in the air and is one that I always look forward to. I always wanted to be involved with aircraft since I was a schoolboy and now I am lucky enough to fulfil that ambition. In two or three years I will have to move on to another posting within the Police, but this will allow someone else to have the pleasure that has been mine for five years. When my time with the Air Support Unit ends there will be sadness but also lots of memories of the good times.

Tony Madge

Opened The Box, Now What?

Where to begin in flight simulation

So you've loaded up your flight simulator and flown a few trial flights before deciding to devote a few hours to improving your skills. But where do you start? PC Pilot is here to show you, and give you the lowdown on how to get the most out of your sim, be it Microsoft Flight Simulator 98, 2000, Fly!, Flight Unlimited III or any other.

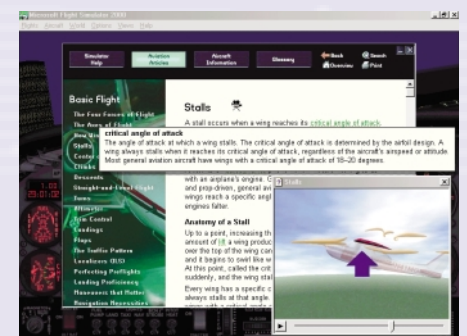
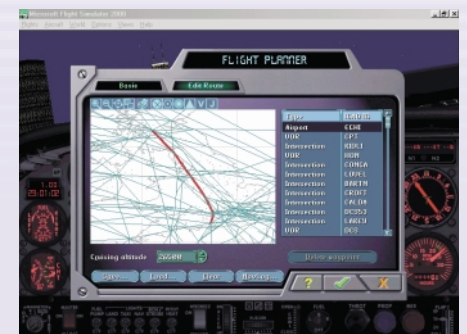
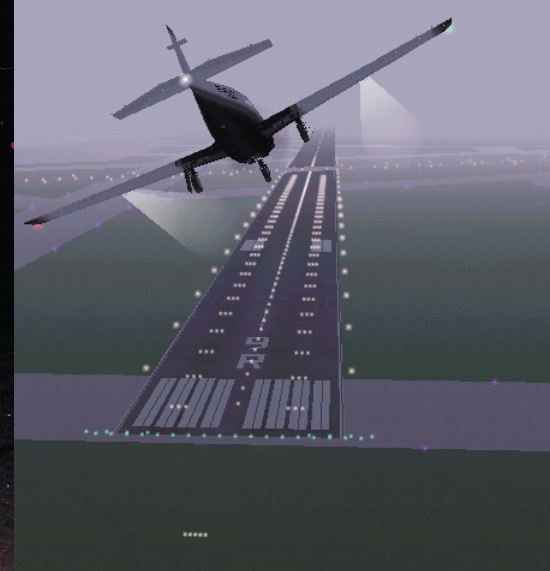
Luckily, these days most flight sims come complete with manuals the size of bricks and plenty of interactive tutorials to take you from absolute beginner to master of the skies. While these are a great resource it can often be daunting when what you really want to do is spend as much time as possible in the cockpit. Of course, this is exactly what real trainee pilots crave, but spending a little time in ground school will pay off in the long-term. As you'd expect in this multimedia age, much of the basics can be covered remarkably quickly by making use of the in-built help, which is often very clear and more importantly, concise. So set that joystick aside to see what your particular simulation package has to offer – and don't forget to check any 'readme' files and the publisher's web sites regularly for extra tips and downloads too.

Back to the printing press

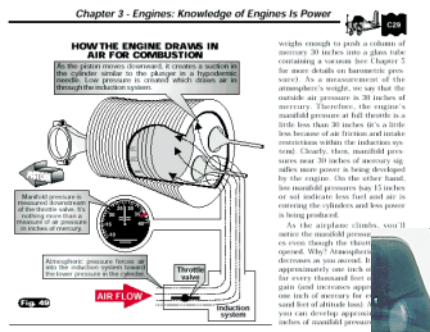
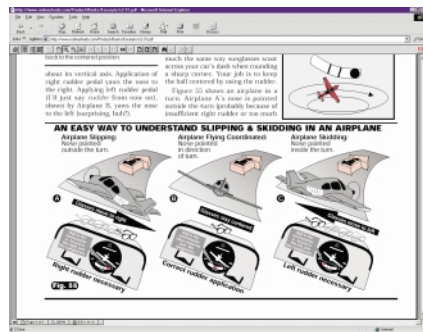
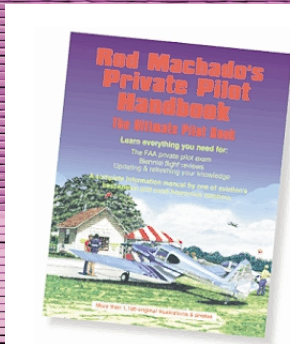
For those who prefer to read up on their newfound hobby away from the screen, there are a variety of books available to increase your knowledge and awareness. Official guides such as Flight Simulator 2000: Inside Moves from Microsoft Press, can provide invaluable information for the novice and expert alike. As you can see from our tutorials, Bill Stack has a knack for making the difficult seem straightforward and his books reflect this. Another celebrated author is Rod Machado, whose light-hearted approach to writing makes for a great read. Rod's wonderful Private Pilot's Handbook is a huge hit with PPL (Private Pilot's License) contenders, and is equally relevant for flight simmers. Owners of Flight Simulator 2000 are lucky enough to not only have a manual written by Rod, but also to have him sitting next to them in the excellent flight tutorials. These lessons take



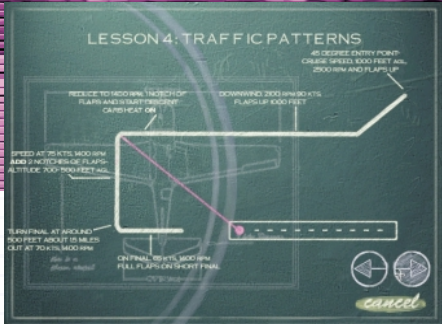
Our own Bill Stack has a range of books dedicated to flight simmers, check out www.topskills.com for more info



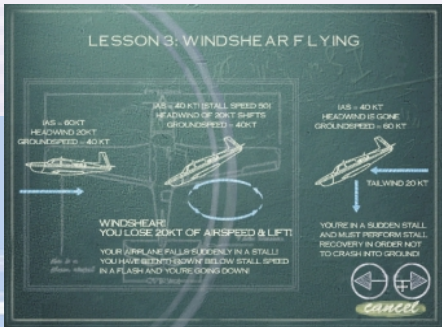
Flight Simulator 2000 has masses of online help, so take advantage of it



Once you've become acquainted with Rod Machado in the Flight Simulator 2000 tutorials you may do well to graduate to his real pilot's handbooks – see www.rodmachado.com for some real treats



Integrated ground school with instructor flights makes Flight Unlimited III ideal for learners



Third-party developers can take advantage of this to create more exciting situations, and even build full ATC system add-on packages such as RealATC and Proflight 98. The included Flights and Adventures are a good starting point to develop your flying skills and explore the more interesting parts of the Microsoft Flight Simulator world.

The World Wide Warehouse

One of the huge advantages of flying on a PC is that you can fulfil your dreams and fly any aircraft imaginable. Of course, you're initially limited to the Cessnas and Learjets that come in the box. Things are better now with Concorde and the 777 in Flight Simulator 2000 and the rather fun selection in Flight Unlimited III. However, that's only the start. The ability in the Microsoft product (and its gun-toting sister, Combat Flight Simulator) to import custom-made aircraft has fuelled the community enormously. With thousands of virtual aircraft designers worldwide, practically every plane, helicopter and even airship ever flown has been recreated. Fly! has a growing number of third-party developers too.

Knowing that all of this wonderful bounty is out there is one thing, but finding it can be another matter all together. Thankfully, more and more high-quality aircraft collections are available in the High Street, from publishers such as Abacus and The Associates. For starters try out the RAF Collection and Combat Pilot on our cover CD, both of which install in a snap and have a wide variety of aircraft to try. And for an example of what Free- and Shareware is out there load up Concorde Experience, or to really expand your horizons hook up to the Worldwide Web and prepare to be amazed...

By far the most cost-effective add-on for flight simmers is a modem. In this age of free internet access there's no excuse not to get wired and tap into the breadth of resources in cyberspace. Three of the largest web sites are The simFlight Network (www.simflight.com), AVSIM (www.avsim.com) and FlightSim.com



(www.flightsim.com). They provide central repositories of aircraft uploaded by the army of developers spread across the globe, as well as daily news updates. New aircraft are constantly being added, so there is never a supply shortage. The quality of these creations is usually excellent, but for the more discerning pilot you may want to check out the flight test reports filed at the Black Box FS Test Facility (www.blackbox.simflight.com). This group of dedicated simmers aims to objectively assess new aircraft and make them available for download, and what sterling service they deliver. Recently over fifty people applied to become test pilots, but only four passed muster to help maintain the stringent standards!

Another great and reliable information source is the very large and popular TheMag@simflight.com. This is a free e-mailed flight simulation newsletter that hands out tricks, aircraft specifications and links to downloads and lots more. You can subscribe to this great weekly event at www.simflight.com/themag and have it



Flight Unlimited III and Fly! have built-in Flight Planners, with save capabilities, so that you can create your own Flights to fly over and over again and share them with friends. They also provide Challenges and Scenarios that are analogous to the Adventures in the Microsoft simulator. Flight Unlimited III is particularly enticing as the dynamic scenery objects are interactive. Chasing speedboats and convoys of trucks has a certain James Bond feel to it and brings out the stunt pilot in everybody.



delivered to your Inbox every Saturday morning.

One thing to remember is that Shareware isn't free. The idea is to give you a chance to try out the product and register for the normal price if you like it. Not doing this may seem like sense, but ultimately you're ripping off the person who spent hours toiling away to make your life that little bit better. By rewarding Shareware authors you can help guarantee the future of the developer community, which is good news all round.

Scenery

Next to flying your dream machine, being able to explore the world or just basing yourself at your home airport is the biggest buzz in flight simulation. The extended global coverage offered by Flight Simulator 2000 means that even the smallest airfields are represented. However, the level of detail can be disappointing in more obscure places - like the UK! As with the custom aircraft, there is a legion of fans dedicated to improving the default scenery. Some of these folks have turned 'pro' to transform their hobby into a job. Some truly remarkable products are now available, such as Pacific Northwest Scenery, Airport 2000 and Grand Canyon. Again, look to the web to find a huge collection of add-ons to download too. We've included a taster of Chris Wilke's excellent Virgin Islands scenery on the CD, which shows the quality also available from Shareware authors. One of the best places to check is the Scenery Hall of Fame, <http://users.erols.com/tdg/>, as well as the Flight Sim Web Ring, www.innolinx.com/gamequadrant/fsring/, which is a great

jumping off point to hundreds of other web sites. For great UK scenery the Magrathea team, www.magrathea.clara.net, provides an ever-expanding set of vistas. If you can't find what you're looking for then you can always have a go yourself. Many updated tools are being released now, so check out the reviews section to see what you need to get started.

Feeling lonely?

Another great thing about flight simming is the community spirit. Just as in real aviation circles, like-minded people are always happy to pass on tips and share their experiences. Again, the web is the ideal forum where this can take place. Newsgroups, such as simFlight News Network www.simflight.com/snn have traditionally been hotbeds of activity. Now there are many web-based discussion forums, which can be easier to find and use for the novice. AVSIM (www.avsim.com) and FlightSim.com (www.flightsim.com) and Microwings (www.microwings.com) also host forums where you can simply lurk to absorb all of the discussion, or dive in and take part.

Much better than simply talking about flying with your new-found buddies is to join them in the friendly skies. Multiplayer support over the internet, complete with simultaneous voice communications using software such as Pro Controller (www.avsim.com/mike/sb_pc/pchome.htm) or Squawk Box (www.avsim.com/mike/sb_pc/sbhome.htm) and controlled by real ATC operators from SATCO (www.satco.org) means that fly-ins are now commonplace. Check out (www.avsim.com/hangar/satco/satuk/) to join the party.

VIRTUAL AIRLINES FOCUS ON NOBLE AIR

For those who want to bring some structure to their flying, joining a virtual airline is ideal. Noble Air is one such organisation and PC Pilot talked to Bernie Stafford, General Operations manager for Noble Air's Manchester hub to find out what it means to be involved in a virtual airline (often referred to as VA).

PC Pilot: What is a virtual airline?

Bernie: A virtual airline is an organisation that operates over the Internet. Pilots are assigned flights from the airline's timetable, fly them with the degree of real-world accuracy and weather that they wish, and then send reports to the airline. Promotion is usually based upon number of hours flown. Within the limits of the timetable, pilots may fly whatever aircraft they prefer.

PC Pilot: What does being General Ops manager involve?

Bernie: General Operation Officer is a multi-faceted role. My main responsibility is to maintain the pilots database. I also liaise with other members of the management team regarding the running of the hub, and creation of special flights and adventures. At the moment I am project managing our attendance at the Birmingham Flight Simulation Show in December, so it keeps me pretty busy!

PC Pilot: What sort of qualities are Noble Air looking for in their pilots?

Bernie: Enthusiasm for the hobby, and a desire to improve their skill level through practice and challenge.

PC Pilot: What do members get most out of being part of a VA?

Bernie: A reason for flying, challenges, the opportunity to develop their skills, a feeling of belonging to a body of like-minded individuals who share the same hobby. Whatever your skill level, and whether your preference is piloting a J31 on short hops, or flying the 'heavy metal' on inter-continental routes, virtual airlines have something to offer everyone who is interested in flight simulation.

PC Pilot: What does it take to join Noble Air?

Bernie: No 'real-world' aviation experience is necessary to join a virtual airline - just a desire to improve your skills, and to have a reason for flying, rather than



Noble Air Manchester Hub

www.lionwing.co.uk

40 active pilots

59 aircraft serving 118 destinations
Logged over 6,000 flying hours in 1999

Carried over 3 million
passengers in 1999 so far

Noble Air World-wide

www.nobleair.com

Approx 1,500 pilots

Flying from 27 locations
(5 of which are in the UK)

thinking "what shall I do today?". No costs are involved apart from normal Internet connection costs, and it is definitely not necessary to own a cutting edge machine - mine is over three years old, and is perfectly adequate for the flying (and the software) that I use.

PC Pilot: How much interaction is there between crew members?

Bernie: Given that we are a worldwide organisation, not much face-to-face! However, the 'pilots lounge' is an opportunity for anybody to air their views (within reason), and communicate with other pilots for advice or help.

Noble Air is just one of many Virtual Airlines around the world. UK Direct is another operator. While they weren't taking any new pilots on at the time of going to press, be sure to check their excellent web site, www.fltman.force9.co.uk, as the roster is ever changing and there are some good flying tips, aircraft and UK airports to download and get in training. VA World on AVSIM provides a good starting point to find the airline that is right for you.



Stick-Em Up!

The ultimate showdown - joystick or slapstick?

The virtual flying experiences on our computers are mostly dependent on visual input, perhaps followed closely by the sensation of sound. While these two senses have been the primary focus of hardware developers, the last few years have seen attention paid to vibrations we can feel through our fingers, hands, and even our spines. Game controllers, whether they are pads, joysticks, flight yokes, or even chairs, can play a giant role in the degree of realism we experience.

PC Pilot rounded up eight joystick controllers from five manufacturers to see just how our flight time could be enhanced. USB, game-port, serial port, force-feedback, digital and analogue are all tested. Read on and find out what's hype and what's right.

Here are some things we suggest you consider before purchasing a joystick:

- **Ergonomics:** Simply, how comfortable is the stick in your hand? Does it feel too large or too small? Does it feel like a plastic plank nailed to the floor? Pay close attention to fit and comfort, and always remember how subjective this is. Left-handed people have not been forgotten - though we only tested one ambidextrous model, there are left-handed specific ones available.

- **Force-Feedback:** To shake or not to shake, that is the question. While the force-feedback models generally cost more, they do enhance the realism factor. During our testing of these models, it was necessary to adjust the force settings with nearly every stick (to keep our monitor from falling off the desk!).

- **Interface:** Be sure you have a port that supports the controller you are interested in, be it a standard game port, USB, or serial port.

- **Rudder (Z-axis):** If you have rudder pedals or are considering them in the near future, this is an important one. Some sticks have a twist axis and will not work with certain pedals.

- **Buttons:** How many and how are they arranged? Can you rest your hand on the controller and not inadvertently press a button during a flight that could prove disastrous?

TEST BED

All testing was conducted on the following hardware arrangements to give a good range of processors and cards:

450 MHz Pentium II
128MB SDRAM
ABIT BH6 Motherboard
Voodoo3 2000 Video Card
Creative Ensoniq Audio PCI
Seagate 4.3 GB Hard Drive
Windows 98

400MHz AMD K6-2
128 MB SDRAM
ASUS P5A Motherboard
Creative Blaster Banshee
Diamond Monster MX200
Seagate 4.3GB Hard Drive
Windows 98

550MHz Celeron
192MB SDRAM
ABIT BH6 Motherboard
Creative TNT2 Ultra
Creative PCI64 Sound
Maxtor 5.1 GB Hard Drive
Windows 98



game port nearly always corrected it. This led us to believe that Windows 98 is responsible and the last word we received was that the Special Edition release of Window 98 would correct this.

Technical Issues

We experienced a few noteworthy problems along the road. First of all was the general instability of utilising the USB port, regardless of which system was being used. There were times we lost throttle control and others when the stick simply did not function. Plugging the controller into the

The Diamond Monster MX200 sound card gave us a few headaches as well, being rather fussy about things. There were times when it just did not recognise the fact we had plugged in a joystick! There was no apparent pattern or rhythm to this and left us scratching our heads.

The sky's not the limit

Cracking open your brand new flight simulator is far more than just another game. It reveals a whole world of possibilities and is just the beginning of something huge. If you, like thousands of others worldwide, take a little time to get to know your way around the cockpit then you will be guaranteed a lifetime of fun and challenging times flying the virtual skies. Enjoy!

Kenji Takeda & Mike Clark



Non Force-Feedback



Blackhawk Digital

Manufacturer: Gravis
Web: www.gravis.com
Price: £29.99

The Gravis Blackhawk Digital is a classic catch-22 situation; simplicity and size are its allies as well as its enemies. While the platform takes up very little desktop space, the stick is rather short and did not quite present itself as a flight simmer's dream. Five programmable buttons, an 8-way hat switch, throttle wheel, and game-port connector sum up its features. The missing Z-axis (twist) control and miniature size make this offering from Gravis more suited to beginners and small fisted flyers. Installation through the supplied Gravis Experience software was easy and calibration a snap.

OUR CHOICE

Xterminator

Manufacturer: Gravis
Web: www.gravis.com
Price: £59.99

Stepping up from the Blackhawk is the Xterminator DualControl, a two-handed unit with a unique base and button layout. Available in USB or game port, the Xterminator has 9 programmable buttons, a throttle wheel and an 8-way POV (point of view) switch. An extra control knob, convenient for one's left thumb, provides rudder inputs, though we found it to be extra sensitive, even with Flight Simulator 98's settings minimised. While we liked the D-pad comfort and convenient button arrangement, the Xterminator's weak springs and somewhat sloppy feel left us aching for more.



Precision Pro

Manufacturer: Microsoft
Web: www.microsoft.com/hardware
Price: £49.99

The Precision Pro is no stranger to flight simmers and still offers an excellent option, although Microsoft's prices are higher than most. Functioning X, Y, and Z axes, good ergonomics, USB and game port compatibility, and perhaps the best 'thumb fan' in the group, there isn't too much to frown upon here. The only complaint is with the soft spring in the stick's X and Y axes which when compared to Logitech's, was a bit mushy. This stick occasionally gave us connection problems when using a Diamond Monster MX200 sound card, but worked fine with a Creative Labs PCI64 board.



Wingman Extreme Digital 3D

Manufacturer: Logitech
Web: www.logitech.com
Price: £29.99

Logitech enters the arena with two entries. The first here, Extreme Digital 3D, though not a force-feedback model, was one our favourite controllers. The combination of excellent ergonomics and precision inputs brought us back to this joystick time

after time to compare against others. With a functioning Z-axis, 7 programmable buttons, a throttle lever you can actually get two fingers on, and excellent side 'forces' (spring tensions), this is a fine stick worthy of consideration.

The only issue to speak of regards the 'thumb fan' at the top of the stick. The distance between buttons 2, 3, 4 and 5 (which are nicely labelled) is slightly greater than Microsoft's Precision Pro or the Gravis Xterminator, so if your hand is small you may find this slightly uncomfortable. Logitech's Wingman software is an excellent utility for testing, though we rarely found calibration necessary.

OUR CHOICE

Force-Feedback Sticks



Force-Feedback Pro

Manufacturer: Microsoft
Web: www.microsoft.com/hardware
Price: £89.99

This workhorse vibrated itself off the test bench once or twice, never seemingly affected. Its handle and button layout is identical to its little brother, the Precision Pro, and its base is only slightly larger. Like all the entries, the software included enables one to set different button profiles for different games. While we like this feature, it seemed simpler to assign the buttons within Flight Simulator 98 or 2000. The only complaint we had with the Force-Feedback Pro was an occasional loss of input, which we were able to fix by re-calibrating. The Force Feedback Pro comes with Sidewinder software and a copy of Mech Warrior 3 (not a flight simulation!).



Force-Feedback

Manufacturer: Guillemot
Web: www.guillemot.com
Price: £79.99

Force FX

Manufacturer: CH Products
Web: www.chproducts.com
Price: £129.95

The Force FX was the most consistent, trouble-free, and user-friendly controller out of the Force-Feedback group. We preferred its square base to the others, as it sat nicely within the confines of our space-limited desktop. The FX's default force settings were right on the money, offering just enough sensations to give us that little extra, but without the bone-jarring tremors that are sometimes apparent in force-feedback controllers. The FX lacks one rather important feature, however. There is no throttle wheel present on-board, forcing (excuse the pun) you to either use the keyboard or purchase the Pro Throttle, also manufactured by CH Products. PC Pilot was fortunate enough to have this setup for testing the FX and while it is very enjoyable to fly with, it does limit the market for the FX and make for an expensive package. The CH FX comes equipped with two 4-way hat switches, five buttons, trim controls, full versions of Warbirds, DirectX 6.1, Netscape 4.5, and demos of X-Plane, Thief, Heavy Gear II, Air Warrior, and GameSpy.

OUR CHOICE



Wingman Force

Manufacturer: Logitech
Web: www.logitech.com
Price: £79.99

An oddly shaped entry into our roundup, the Wingman Force nearly rattled our teeth loose. The default force settings were set extremely high and some adjusting was needed to make this stick usable. While we liked the shape of the stick, it's red colouring of the buttons and throttle wheel made it look rather cheap. Additionally, it behaved somewhat erratically; we sometimes felt only slight forces, while at other times it nearly tore off our arms! This was one of the controllers affected, we believe, by the bug in Windows 98. If the

Windows 98SE (Special Edition) cures the USB problem, and

Logitech can tweak their drivers a bit, this would be a strong contender. Comes with the latest Wingman Profiler software, Redline Racer, and Freespace.

A new name in game controllers, Guillemot (having recently purchased Thrustmaster) submitted the only ambidextrous stick of the bunch and topped it off with a soft kevlar coating. Our hands smiled a bit whilst embracing this odd shaped stick, as we had forever been accustomed to hard, cold plastic. Though it takes a big bite out of your desktop space, the 8 programmable buttons and throttle wheel are conveniently placed at the front. A small thumb wheel at the top of the stick,

which at first seemed strange, handles rudder control, but with time became second nature. Unfortunately the stick developed what appeared to be a mechanical problem half way through its flight test. Left turns became very difficult, as if a spring had become dislodged within the base. A telephone call and two e-mails later, while responding that they "were looking into it", had not given us any answers at press time. This would be even more annoying if we had just spent £80.

NON-FORCE FEEDBACK	Gravis N/A	Gravis N/A	Logitech 01306 734 300	Microsoft 0870 6010100
	Blackhawk Digital	Xterminator	Digital 3D	Precision Pro
Features				
USB Port		Yes	Yes	Yes
Buttons	5	9	7	9
Throttle	Yes	Yes	Yes	Yes
Twist Function		Yes	Yes	Yes
POV (hat switch)	8-way	8-way	8-way	8-way
Warranty	3 year	3 year	1 year	1 year
Price	£29.95	£59.99	£29.99	£49.99
Scores (0 to 5)				
Setup and Calibration	5	4	4	3
Ergonomics	3	3	4	4
Platform Size	3	3	5	4
Button Layout	3	4	3	4
Performance	2	2	5	4
PC Pilot Rating	👍👍👍👍👍	👍👍👍👍👍	👍👍👍👍👍	👍👍👍👍👍

FORCE FEEDBACK	CH Products 01275 474550	Guillemot 0181 686 5600	Logitech 01306 734 300	Microsoft 0870 6010100
	Force FX	Force Feedback	Wingman Force	Force Feedback
Features				
USB Port	Yes	Yes	Yes	Yes
Buttons	10	10	9	9
Throttle	Yes	Yes	Yes	Yes
Twist Function		Yes		Yes
POV (hat switch)	4-way	8-way	8-way	8-way
Warranty	6 month	3 year	1 year	1 year
Price	£129.95	£79.99	£79.99	£89.99
Scores (0 to 5)				
Setup and Calibration	5	4	3	3
Ergonomics	3	3	4	4
Platform Size	5	3	2	4
Button Layout	3	5	3	4
Performance	5	3	3	3
PC Pilot Rating	👍👍👍👍👍	👍👍👍👍👍	👍👍👍👍👍	👍👍👍👍👍

Final Analysis

In the end, the combined package of the CH Product’s Force FX and the Pro Throttle was our favourite setup. However, we would choose the Microsoft Force-Feedback Pro if money were a concern,

while the Logitech Wingman Extreme Digital 3D is easily the choice for a standard joystick.

So we wonder...does anyone produce a force-feedback flight yoke that’s any good? The next issue provides the answers! ■

TIPS AND TRICKS

Editor Mike Clark gives hints and advice on some common problems:

Strange Cracks and Pops from Speakers?

Speakers are funny things, almost temperamental. They are very susceptible to interference from other electronic devices. It isn’t usually the speakers that have the problem it’s the cables that connect them to your computer. The most common problem that people experience is buzzing, humming, clicking, spluttering, pops, farts and cracks. Many of these noises are caused by electrical cables rated at mains voltage, devices being switched on and off (central heating is a classic) or radio and digital broadcasts.

Solution 1: Make sure that all mains cables to and from your PC are earthed correctly (green and yellow wire on the plug).

Solution 2: Check all the connections to and from your speakers. Are they plugged in correctly?

Solution 3: Has a cable been damaged? Look for scuffs, chafes or breaks that might cause a short circuit.

Solution 4: Make sure that your speaker leads are not close to any power cables. If they are and you cannot move them, make sure that they cross each other at 90 degrees. Why 90 degrees? Well it’s all due to the electromagnetic fields that surround mains cables. If you remember at school, power cables, magnets or suchlike emit a strong field emanating lengthways. If you lay your cables across each other at 90 degrees, the currents of both cables are not heading in the same direction, thus you are preventing those fields from interfering with one another. Technical but we promise it works.

Solution 5: Buzzing and other unwanted noise from your speakers can also come directly from your sound card. The less expensive (cheap) sound cards often have certain smoothing devices (capacitors and chips) removed during manufacture or they aren’t included at all. Removing such components keeps the cost down. You get what you pay for. Try to at least purchase a half decent sound card like a Creative Blaster PCI 128 (that you can now purchase for as little as £49.99). So, it is always best to try and hunt around for a good quality sound card because in this way you will save yourself needless expense in the future.

St-St-Stutters and Pauses in Flight Simulator 98 and 2000

Solution 1: Disable automatic screen savers and use them manually by creating a shortcut.

Screen savers, especially 3D screen savers, are deadly to a computer’s processor. If you disable a screen saver before using Flight Simulator you will: a) free up more memory, b) free up processor power and c) stop annoying messages that say that your hard drive defragmentation has been interrupted 10 times. Some people place a shortcut to their screen saver on the desktop. Note: you can still have a password protected screen saver when using it manually but just make sure that you set your password first in the ‘Display/Screen Saver’ Dialogue, click on Apply and then disable the screen saver again. The password is kept in a Windows configuration file for later use.

Solution 2: Disable any virus-checking software that runs in the background.

When you are not sending e-mails, or surfing the net, disable any virus checking software that runs in the background. Virus-checking software is great for when you are online, checking e-mails, starting and shutting down your PC or doing a twice weekly scan of all your files. When you are flying around in Flight Simulator it is pointless, so disable it. You won’t regret it and you will give your processor a well-deserved break from continually monitoring your system gaining valuable FPS (Frames Per Second).

IMPORTANT NOTE: IF YOU USE OLDER VERSIONS OF VIRUS CHECKING SOFTWARE YOU MUST RE-ENABLE THAT SOFTWARE BEFORE SHUTTING DOWN YOUR PC! THIS IS EXTREMELY IMPORTANT. IF YOU DO NOT YOUR PC MAY NOT SHUT DOWN CORRECTLY AND YOU WILL HAVE TO REBOOT USING [CTRL+ALT+DEL]. WINDOWS WILL THEN HAVE TO RUN SCANDISK TO START UP AGAIN.

Solution 3: Close running applications by clicking on [CTRL+ALT+DEL].

Select one program in the list one-by-one and then click on ‘End Task’. Note: You MUST make sure that ‘Explorer’ and ‘Systray’ are still running. These are part of the main Windows operating system. Alternatively, download a program called ‘EnditAll.zip’ from the Internet (www.zdnet.com/swlib/ and type enditall.zip in the search box). This will do everything listed above safely and quickly with one simple mouse click.

DON'T TAKE OFF WITHOUT IT!

Flight simulation is the most enthralling and challenging ways you can use your PC. As you can see the genre offers a bewildering array of products and ways of spending your time and money. PC Pilot is the magazine to help you decide how and what you spend your time and money on. We have tried to inform, educate and help you get more from your simulated flights and will continue to do so as we publish future editions.

PC Pilot is like no other magazine. It understands flight simulation is a hobby, not a game. It understands you want utmost realism, but that realism is more than just pretty graphics. It understands flight simmers may know a lot about aviation, but can be daunted by PC technology. PC Pilot delivers quality content issue after issue, allowing you the freedom to make an intelligent, informed choice.

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Glossary

The world of aviation seems blessed with a bewildering array of acronyms. We hope the following will prove a handy reference guide to some of the more widely used terms.

A

ACARS - Aircraft Communication Addressing and Reporting System.
ADF - Automatic Direction Finder/Finding.
ADI - Attitude Deviation Indicator.
ADR - Accident Data Recorder.
AFCs - Automatic Flight Control System (an advanced autopilot).
AFIS - Aerodrome Flight Information Service.
AGL - Above Ground Level.
AHRS - Attitude-Heading Reference System
AIS - Aeronautical Information Service. CAA unit based at London-Heathrow Airport, providing flight-planning services and information for pilots.
AIZ - Aerodrome Information Zone.
AOPA - Aircraft Owners and Pilots Association.
A/P - Airport or Autopilot.
APP - Approach (control).
APU - Auxiliary Power Unit.
ASI - Airspeed Indicator.
ASR - Altimeter Setting Region.
ATC - Air Traffic Control.
ATIS - Automatic Terminal Information Service.

B

BRG - Bearing.

C

CAA - Civil Aviation Authority - the UK aviation regulatory organisation.
CAS - Calibrated Airspeed.
CAT - Clear-Air Turbulence.
CDI - Course Deviation Indicator.
CDU - Control Display Unit.
CH - Compass Heading.
CHT - Cylinder Head Temperature (a cockpit gauge).
C/L - Centre-Line (of a runway, for example).
Clouds - commonly-used abbreviations for cloud types:-
* AC - *altocumulus*
* AS - *altostratus*
* CB - *cumulonimbus*
* CC - *cirrocumulus*
* CI - *cirrus*
* CS - *cirrostratus*
* CU - *cumulus*
* NS - *nimbo stratus*
* SC - *stratocumulus*
* ST - *stratus*
CRT - Cathode Ray Tube (television monitor).
CRS - Course.
CSU - Constant-Speed Unit.
CTA - Control Area.
CTR - Control Zone.
CVR - Cockpit Voice Recorder.
CZ - Control Zone (USA).

D

DF - Direction-Finding.
DH - Decision Height.
DI - Direction Indicator.
DME - Distance-Measuring Equipment.

E

EADI - Electronic Attitude Director Indicator.
ECU - Environmental Control Unit.
EFAS - Electronic Flash Approach Light System.
EFIS - Electronic Flight Instrument System.
EGT - Exhaust Gas Temperature (a cockpit gauge).
EHSI - Electronic Horizontal Situation Indicator.
EICAS - Engine Indicating and Crew Alerting System.
ELT - Emergency Locator Transmitter.

F

FAA - Federal Aviation Administration, USA equivalent of UK CAA.
FADEC - Full-Authority Digital Engine Control.
FAF - Final Approach Fix.
FDR - Flight Data Recorder more popularly known as the 'black box'.
FL - Flight Level.
FMS - Flight Management System. Also referred to as FMC (Flight Management Computer)

G

GCA - Ground-Controlled Approach
GNSS - Global Navigation Satellite Systems.
GPS - Global Positioning System (Navstar).
GPWS - Ground Proximity Warning System.
GS - Glideslope.
G/S - Groundspeed.

H

HDG - Heading.
HF - High-Frequency band.
HSI - Horizontal Situation Indicator.
HUD - Head-Up Display.

I

IAS - Indicated Airspeed.
ICAO - International Civil Aviation Organisation (responsible for the codes for airports amongst other things).
IFCS - Integrated Flight Control System.
IFR - Instrument Flight Rules.
IGS - Instrument Guidance System.
ILS - Instrument Landing System.
INS - Inertial Navigation System.
IR - Instrument Rating.
ISA - International Standard Atmosphere.
ITT - Inter-Turbine Temperature.

J

K

KHz - KiloHertz.
Kt - **Knot** - one nautical mile per hour. One knot equals 1.1515 mph.
kW - Kilowatt.

L

LARS - Lower Airspace Radar Advisory Service.
LAT - Latitude.
LDA - Landing Distance Available.
LF - Low Frequency - radio waves with frequencies in the 30-300 kHz band.
LITAS - Low-Intensity Two-colour Approach System.
LOC - Localiser.
LONG - Longitude.

M

M or MAG - Magnetic.
Mach - Ratio of true airspeed to the speed of sound. Mach 1 = 1,100 feet per second or 760 mph.
MAP - Missed Approach Point.
MB - Millibar.
MDA - Minimum Descent Altitude.
MDH - Minimum Descent Height (above ground level).
MET - meteorology, weather.
METAR - Coded aerodrome MET report.
MF - Medium Frequency.
MFD - Multi-Function Display.

MH - Magnetic Heading.
MHz - Megahertz.
MLS - Microwave Landing System.
MSA - Minimum Safe altitude.
MSL - Mean Sea Level
MTOW - Maximum Take Off Weight (less total usable fuel in applicable aircraft).

N

NATS - National Air Traffic Services.
NDB - Non- Directional Beacon.
NM - Nautical Mile.
NOTAM - Notices to Airmen.

O

OAT - Outside Air Temperature.
OBS - Omni-Bearing Selector, used to select the radial from a VOR.

P

PAPI - Precision Approach Path Indicator.
PAR - Precision Approach Radar.
PIC - Pilot-In-Command.
PIO - Pilot-Induced Oscillation.
PLN - Flight-Plan.
PMS - Performance Management System.
POB - Persons On Board. See also SOB.
POH - Pilot's Operating Handbook, an aircraft's 'owner's manual'.
Pooley's - Flight guide to the United Kingdom and Ireland, published annually.
PPL - Private Pilot's Licence.
PTT - Press-To-Transmit.

Q

ODM - Magnetic bearing to a direction-finding station.
QDR - Magnetic bearing from the station.
QFE - Atmospheric pressure at aerodrome elevation.
OFU - Magnetic orientation of runway in use.
QNE - Reading in feet on an altimeter set to 1013.
ONH - Altitude above mean sea level based on local station pressure.
QTE - True line of position from a direction-finding station.
QUJ - True bearing.

R

RAS - Radar Advisory Service.
RCL - Runway Centre-Line.
RBI - Relative Bearing Indicator, displaying information from the ADF.
RDO - Radio.
RIS - Radar Information Service.
RMI - Radio Magnetic Indicator.
RMU - Radio Management Unit.
RVR - Runway Visual Range.
RWY - Runway.
RX - Receiver.

S

SAS - Stability Augmentation System.
SB - Service Bulletin.
SELCAL - Selective Calling.
SFC - Specific Fuel Consumption.
SID - Standard Instrument Departure.
SOB - Souls On Board (see also POB).
SOP - Standard Operating Procedure.
SR - Sunrise.
SRZ - Special Rules Zone.
SRA - Surveillance Radar Approach.
SRE - Surveillance Radar Element of a GCA.
SS - Sunset.

SSB - Single sideband.
SSR - Secondary surveillance radar.
STAR - Standard Terminal Arrival Route, for inbound IFR traffic.
STOL - Short take-off and landing.

T

TACAN - Tactical Air Navigation System.
TAF - Terminal Area Forecast.
TAS - True Air speed.
TCA - Terminal Control Area (USA).
TCAS - Traffic Alert and Collision Avoidance System.
THR or Thld. - Threshold.
TMA - Terminal Control Area (UK)
TO - Take- Off (sometimes TKOF).
TODA - Take- Off Distance Available.
TODR - Take- Off Distance Required
TORA - Take- Off Run Available.
TSD - Technical Standard Order.
TVOR - Terminal VOR.
TWR - Tower (aerodrome control tower).
TWY - Taxiway.
TX - Transmitter.

U

UDF - UHF Direction Finding.
UHF - Ultra-High Frequency.
UIR - Upper Information Region.
UTC - Co-ordinated Universal Time, (Greenwich Mean Time)

V

VAL - Visual Approach and Landing (chart).
VAR - Variation (magnetic)
VASIS - Visual Approach Slope Indicator System.
VDF - Very-High Frequency Direction-Finding.
VFR - Visual Flight Rules.
VHF - Very H igh Frequency.
VIS - Visibility.
VLF - Very Low Frequency.
VOLMET - Continuous recorded broadcasts of weather conditions.
VOR - Very high frequency Omni-directional Range.
VP - Variable-Pitch (propeller).
VRP - Visual Reporting Point.
VSI - Vertical Speed Indicator.

W

WP - Waypoint.
WX NIL - No significant weather, term used in Met reports.

X

XMSN - Transmission.
XPDR - Transponder.

Y

Z

ZFW - **Zero-Fuel Weight** - maximum permissible weight of an aircraft.
ZULU or Z - Used worldwide for times of flight operations (same as UTC).

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- Evaluate your flight performance using the scoring, flight analysis and logbook mode and measure your flight time, flight distance, average ground speed and maximum altitude.
- Excellent graphic quality at maximum frame rate, from 640x480 to 1280x1024 in 32 bits colours !
- Open file architecture allows the pilot to create his own glider or terrain from pictures of any real geographic area of their choice.
- Extended Artificial Intelligence provides the pilot with exciting challenges against other fellow gliders in the sky!

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